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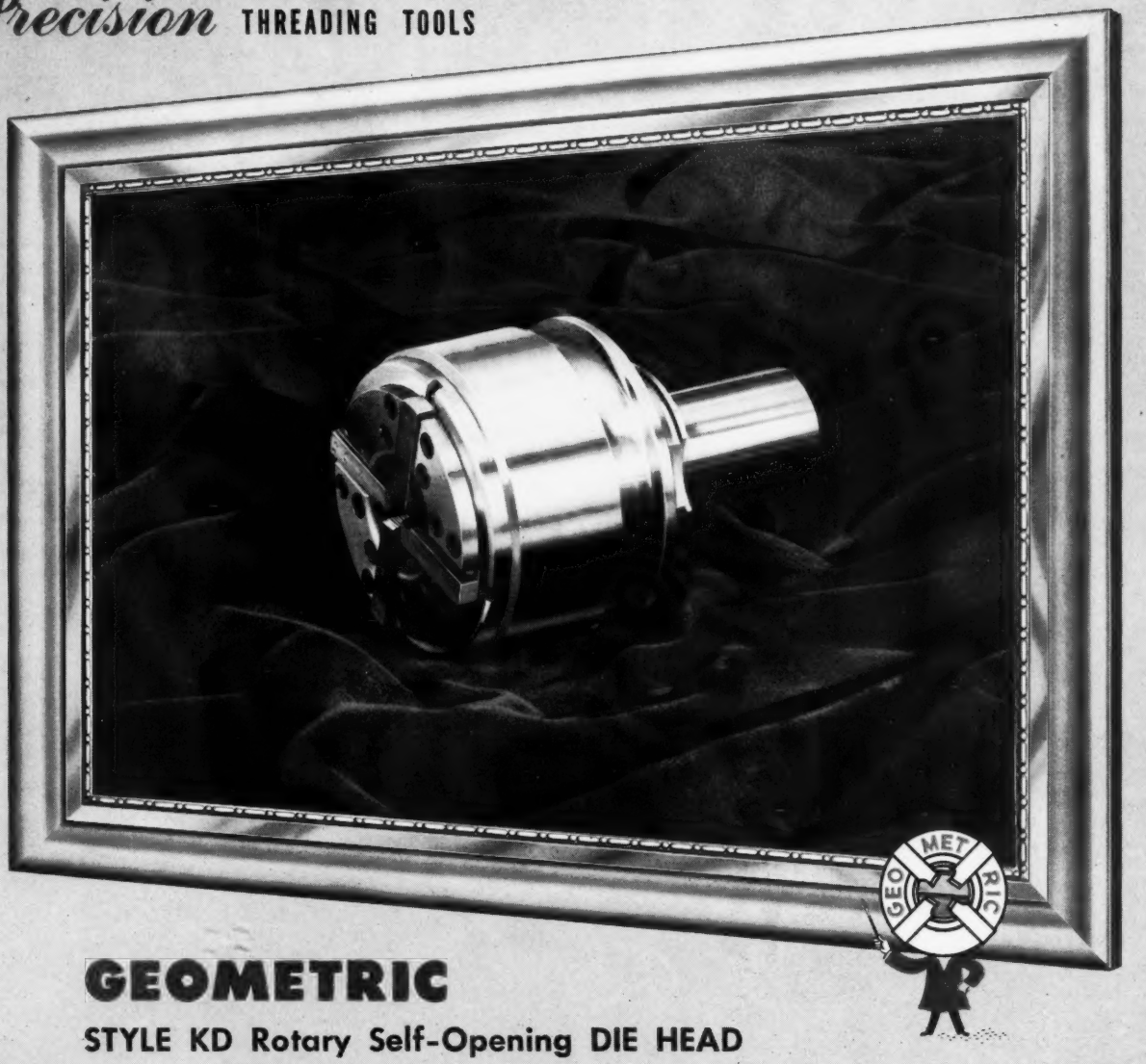

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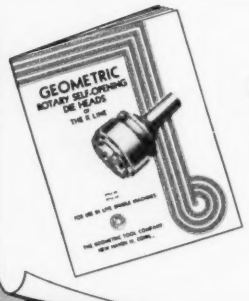

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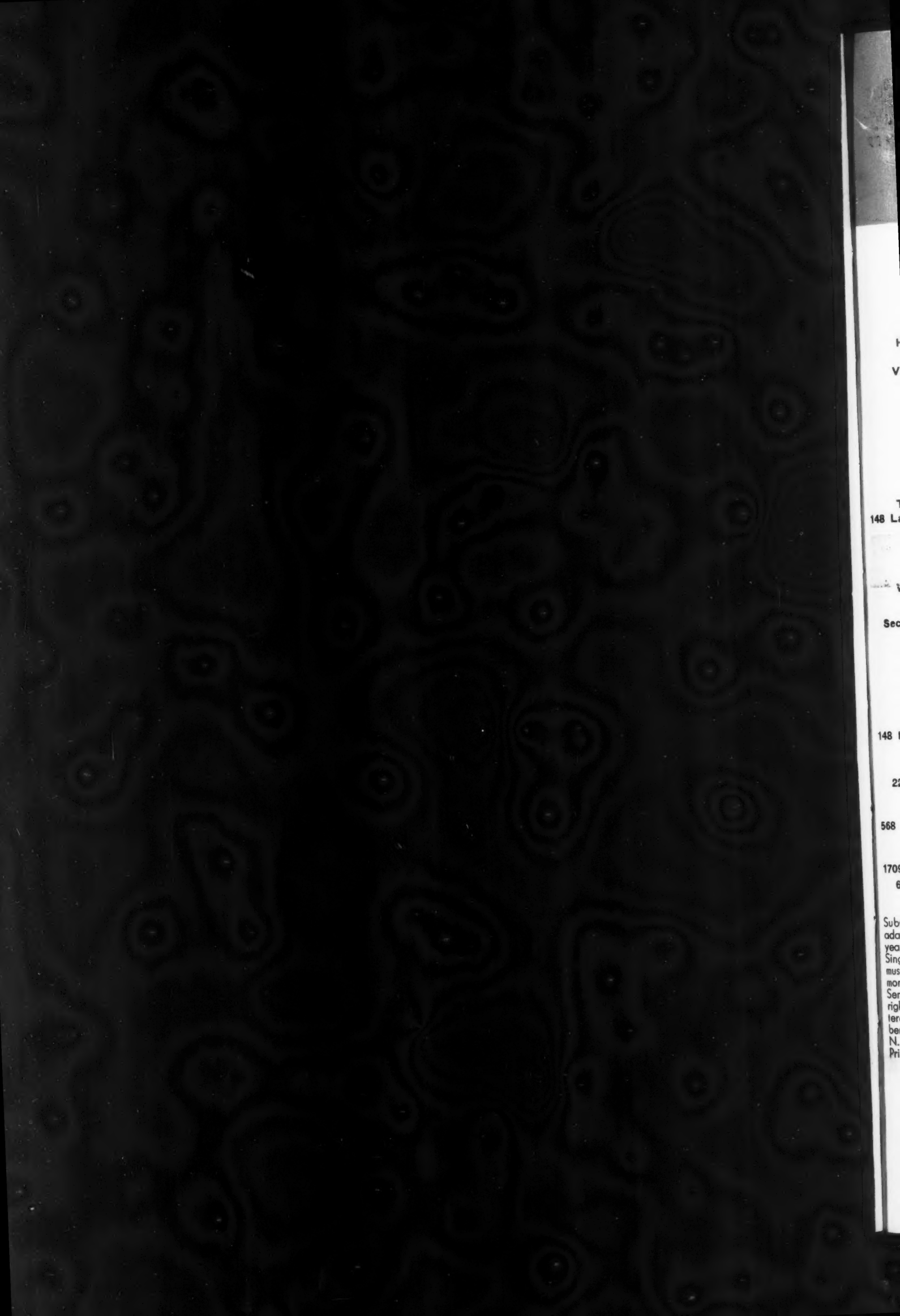

Design, Construction, Operation of Metal-Working Equipment and Manufacture of Metal Products

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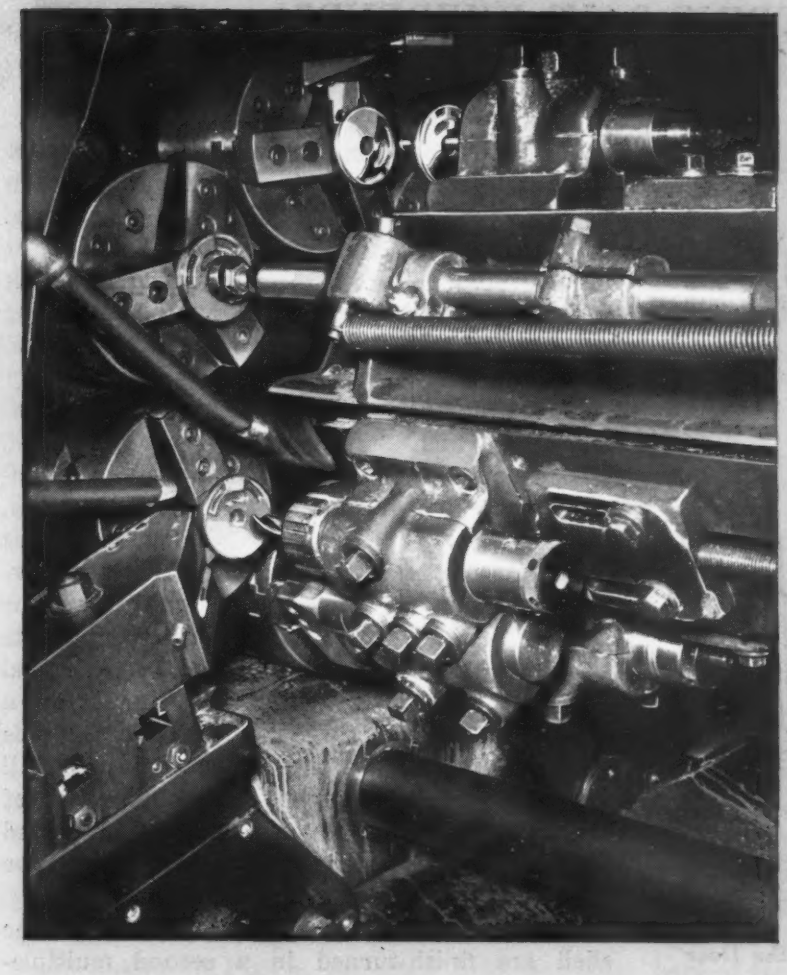


Sound Tool Engineering Pays Dividends

Unusual Set-Ups on Multiple-Spindle Chucking, Precision Boring, Lapping, and Drilling Machines Used in Producing Door-Closer Components at the Yale & Towne Mfg. Co.

By ROBERT S. POTTER
Chief Hydraulic Engineer
Stamford, Conn., Division, Yale & Towne Mfg. Co.

WHEN Yale & Towne Mfg. Co. developed a new line of door closers, it became necessary to produce several components within much narrower dimensional limits than ever were held before on moderate-priced parts of this type. These limits are essential partly because the closer employs a sector-shaped vane, or "rotary piston." As the area of the piston is small, the hydraulic pressures applied are quite high, necessitating unusually close fits between certain parts to prevent leakage. A few of the unusual fixtures and set-ups developed to produce these precision parts at a high rate of production are described in the following.

Much of the precision machining required is performed on the shell or body of the closer, Fig. 1. This shell is a fairly heavy-walled gray-iron casting containing about 15 per cent steel. First a boss on the outside of the closed end of the shell is hollow-milled for use in locating. Then the casting is rough-machined in two set-ups on Goss & DeLeeuw five-spindle chucking machines at the rate of 100 shells per hour.

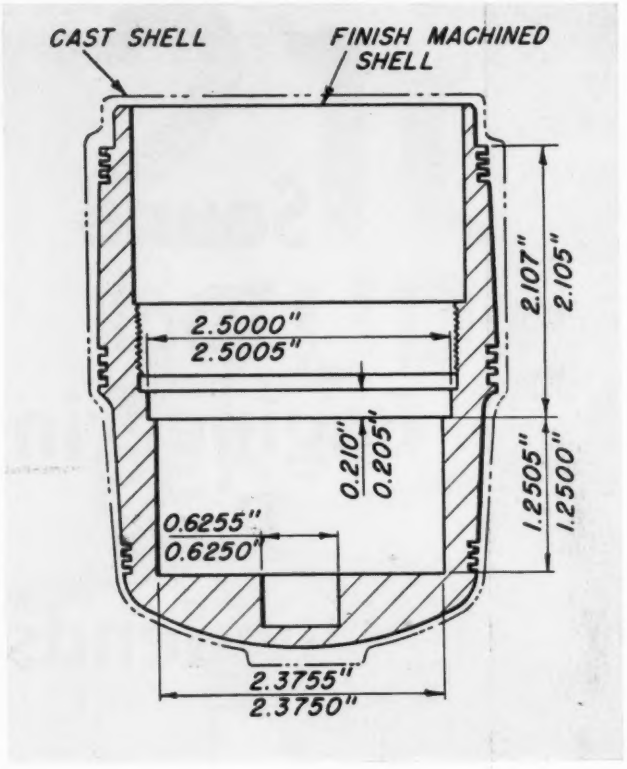


Fig. 1. Cast-iron Shell or Body of the Door Closer, Indicating the Close Tolerances to which This Part Must be Machined

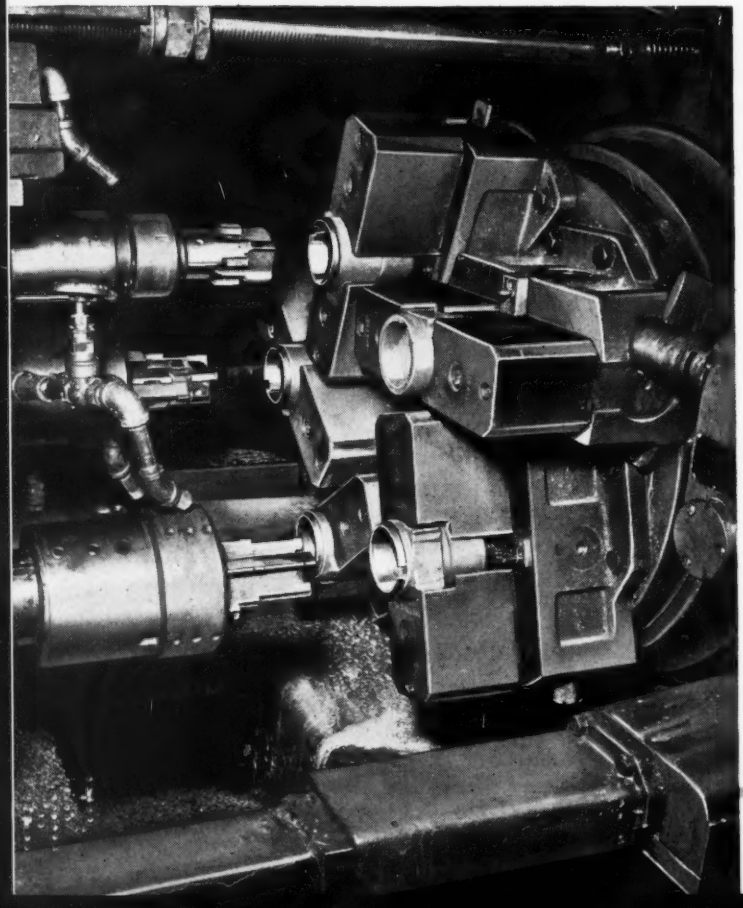


Fig. 2. Five-spindle Chucking Machine Employed for Rough Boring, Facing, and Turning the Open-end Diameter of the Shell Casting

In the first chucking machine, Fig. 2, the castings are held between jaws while the bore is rough-turned and tapped. The jaws are clamped on the work in the loading station, shown at the right center, by a locking screw. The screw is operated by a power wrench having a retracting socket head that rotates in a bracket bolted to the frame of the machine.

The first cutter (seen on the lower front spindle), which consists of four carbide-tipped blades, rough-bores all internal diameters, rough-faces and chamfers the open end of the casting, and rough-turns the outside diameter at this end. At the next station, the inner bottom surface and one shoulder are rough-faced. The third tool takes semi-finishing or finishing cuts on all surfaces previously roughed. At the final cutting station, a tap with a pilot that enters a machined bore further inside the casting is employed to produce the internal thread. All the tools on this machine, with the exception of the tap, have multiple carbide-tipped blades and are classed as reamers, even though they take heavy cuts, and, in some cases, facing cuts.

All but one of the external surfaces on the shell are finish-turned in a second multiple-spindle chucking machine, Fig. 4. The work is located in the rotating chucks by the previously turned ends. When a shell has been chucked and indexed to the second station, shown in the lower foreground, carbide-tipped single-point tools mounted on the tool-slide are fed longitudinally to rough-turn the outside diameters of the closed end and cut off the boss used for locating in the previous operation.

At the third and fourth stations, forming tools mounted on the cross-slides of the machine are employed to finish-form the outside diameter and closed end of the part. At the fifth and final cutting station, shown at the top, decorative grooves are cut at three locations on the outside diameter of the shell. The production rate obtained on this machine is 80 pieces per hour.

Two holes are spot-drilled in the inner face of the closed end by means of the ingenious fixture shown in Fig. 3, which is attached to the bed and turret of a Bardons & Oliver screw machine, as shown in Fig. 5. A precision fixture is

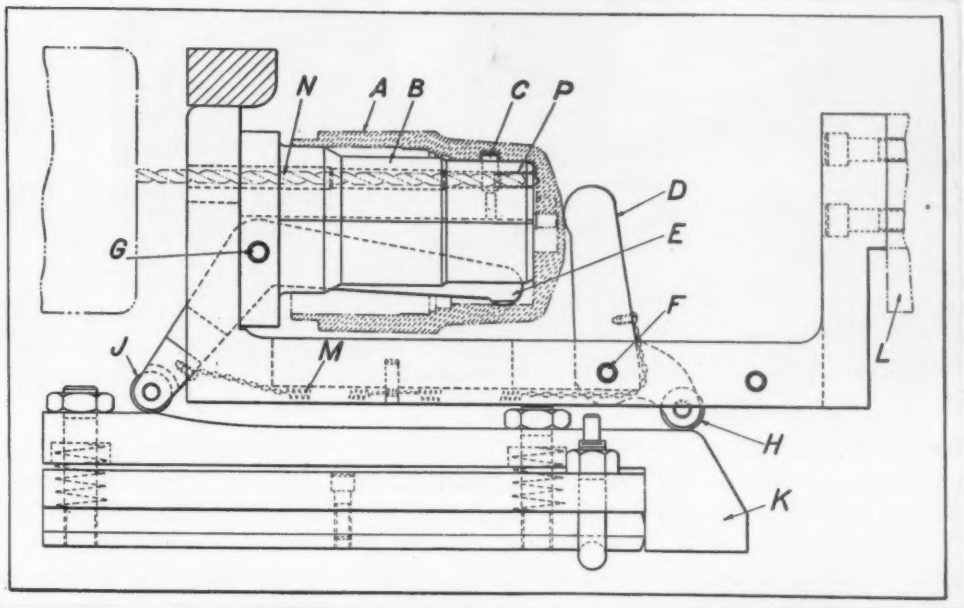


Fig. 3. Details of Fixture Employed for Spot-drilling Two Accurately Located Holes in the Inside End Face of Cast Shell A

required in order to hold to close tolerances both the depth of the conical holes and their location relative to cored grooves in the same surface. Since the cored grooves are not machined, their size cannot be accurately maintained.

As shown in Fig. 3, the shell *A* to be spot-drilled rests on the top surface of arbor *B*. The arbor diameter is smaller than the bore of the shell to permit the shell to be loaded over locating pin *C*. This pin projects into a slot in the inner wall of the shell casting. As the work is applied, it is rotated so that the pin will bear against one end of the slot. This insures correct angular location for spot-drilling one hole.

The work is clamped in the desired position by two cam-actuated bellcranks *D* and *E*, which pivot about pins *F* and *G*, respectively. Rollers *H* and *J*, pinned to one end of each bellcrank, ride on the cam surface of plate *K* as turret *L* of the screw machine is advanced or retracted within limits set by positive stops. In the position shown, the turret has been advanced to the left and the rollers raised by the cam. One end of bellcrank *D* bears against the outer end of the casting, firmly pressing it in contact with a shoulder on the arbor. Bellcrank *E*, which passes through a slot in the under side of the hollow arbor, comes in contact with the bore of the work and presses it down against the upper surface of the arbor.

When the turret and fixture are retracted, the rollers leave the rise on the cam-plate and the work is unclamped by spring *M*, which is con-

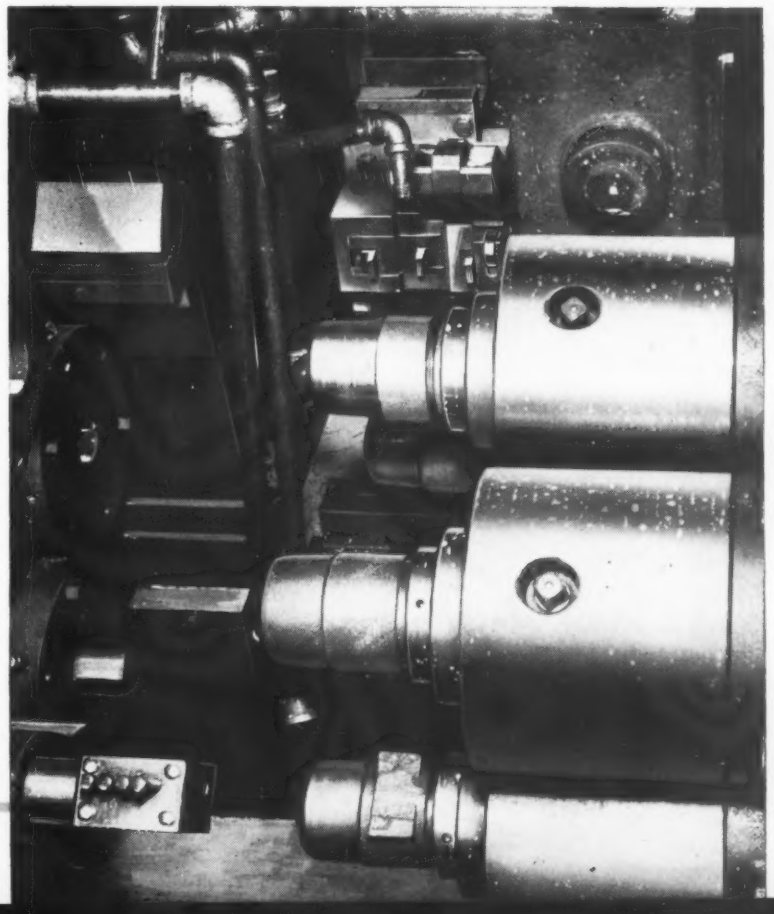


Fig. 4. External Surfaces of Shell are Finish-turned on This Machine, and Grooves are Cut in Periphery

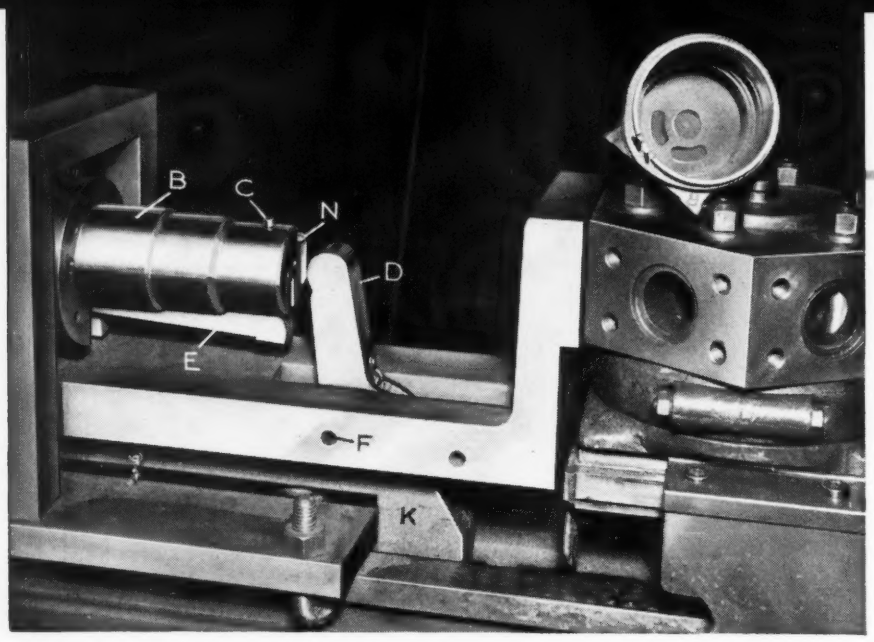


Fig. 5. Fixture Shown in Fig. 3 Mounted on Screw Machine. A Spot-drilled Shell is Seen on the Turret. During Drilling, the Work is Clamped by Bellcranks D and E

nected to the bellcranks by chains. The work can then be rotated until the locating pin of the fixture contacts the other end of the cored slot in the wall of the shell. Clamping is effected by again advancing the turret, after which the second hole is spot-drilled.

The axis of the arbor is offset from the axis of the machine spindle, so that the hole will be drilled at the required distance from the center line of the work. The drill *N* is piloted by bushing *P*, located in the end of the arbor. The fixture is shown unloaded in Fig. 5, with a spot-drilled shell on the turret of the machine.

Precision boring and facing of the shell castings are performed in a single set-up on Heald Bore-Matics equipped with special tooling, as shown in Figs. 6 and 7. In the initial operation on these machines, three internal diameters are finish-bored, and in the second operation, two shoulders and the inside of the shell bottom are faced. From 0.008 to 0.010 inch of stock is removed at a cutting speed of 400 surface feet per minute, and 150 shells are turned on each machine per eight-hour shift.

The work *A* is held inside a hollow cast-iron cylinder *B*, which is mounted on the boring machine spindle. The right-hand end of this cylinder was finish-faced after it had been mounted on the machine to insure accurate alignment. A hardened steel plate *C*, the inner face of which is ground and lapped, is bolted to the finished face of the cylinder. The bore of this plate is lapped to fit the outside diameter at the open end of the shell. Radial location of the plate with relation to the axes of the work and tools, and the height of these axes above the base of the machine, are accurately maintained to hold the close tolerances indicated in Fig. 1.

After being set into the plate by loading through an opening in the cylinder wall, the work is clamped by air-actuated plunger *D*, Fig. 6. This presses an external shoulder on the work against the corner formed by the bore and inner face of the plate. Both the outside diameter and shoulder of the work, used in locating, are accurately turned and faced on a lathe prior to the boring operation.

The tooling employed for this operation con-

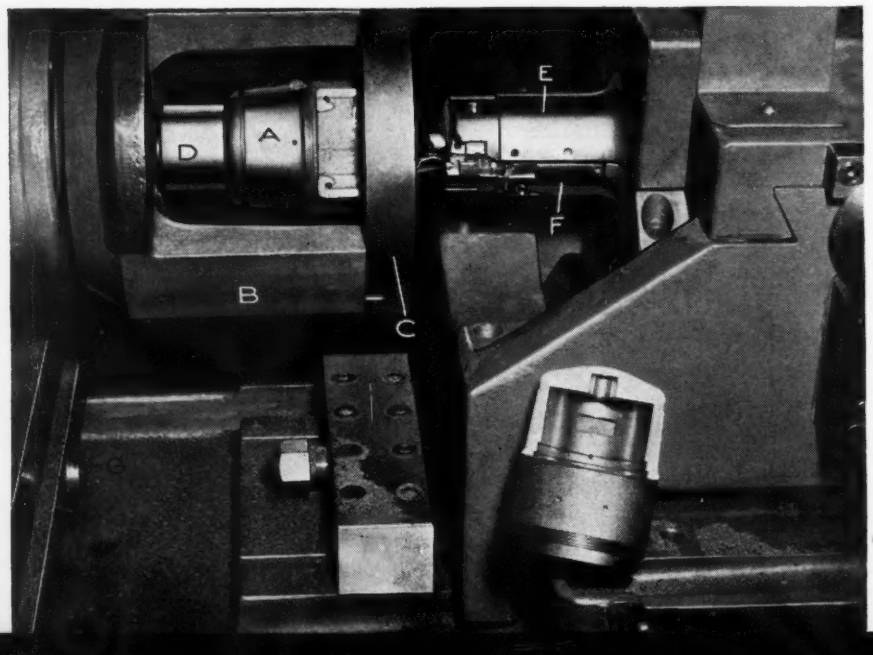
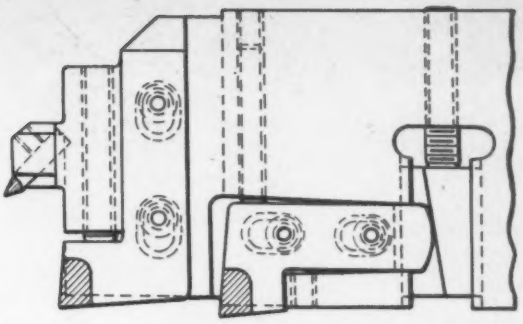
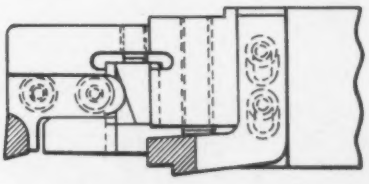


Fig. 6. Set-up for Boring Three Diameters and Facing the Inner Bottom Surface and Two Shoulders of Shell. A Cut-away Part is Shown at Lower Right



UNDERSIDE VIEW OF BORING BAR E



TOP VIEW OF FACING BAR F

Fig. 7. Boring and Facing Bars Employed in the Set-up Shown in Fig. 6. Each Carbide-tipped Tool can be Adjusted by Means of Set-screws and Wedge Blocks

sists of a semicircular-section boring-bar *E* and a similar facing bar *F*. The flat lower face of the boring-bar is parallel with the upper flat face of the facing bar. Boring-bar *E* holds three carbide-tipped, single-point tools, and facing bar *F* two similar tools. Both bars can be adjusted in fine increments either longitudinally or transversely by means of 40-pitch, ground-thread screws and graduated dials. The split nut portion of the adjustment mechanism is arranged for screw clamping to prevent loosening. Also, each tool can be individually adjusted by means of flat-point, socket-head screws and hardened tool-steel tapered wedge blocks, as shown in Fig. 7.

In operation, the boring and facing bars are fed toward the rotating work by the hydraulically operated table on which they are mounted. A stop *G*, shown in the left foreground of Fig. 6, stops the advance of the tools when the boring operation has been completed. Then, with the machine table held against this stop, the facing bar, mounted on a bridge that slides in dovetail ways, is fed transversely until the facing tools reach the preset depth. A production of 150 shells per eight-hour day is attained with this set-up. A cut-away shell casting at the lower right, Fig. 6, shows the surfaces that are precision bored and faced in this operation.

Dial indicator, plug type Comtor gages are employed to check the precise dimensions required for the three inside diameters of each shell. These instruments are frequently calibrated by means of master ring gages. The depth of these three bores is checked on an Electrolimit gage equipped with a special adapter and three carbide tips that contact the two shoulders and bottom face of the work. A fourth bore is inspected by an Air-O-Limit gage.

A cast-iron seal plate, which is clamped against the lower shoulder in the bore of the shell at assembly, is machined on the Baird multiple-spindle automatic chucking machine shown in the heading illustration. The work is loaded at the first station, with its hub held in a three-jaw chuck. It is then indexed to the second station (at the lower left), where the cored hole in the center is drilled, the outside diameter is rough-turned, and one side of the plate and a gasket seat are rough-faced.

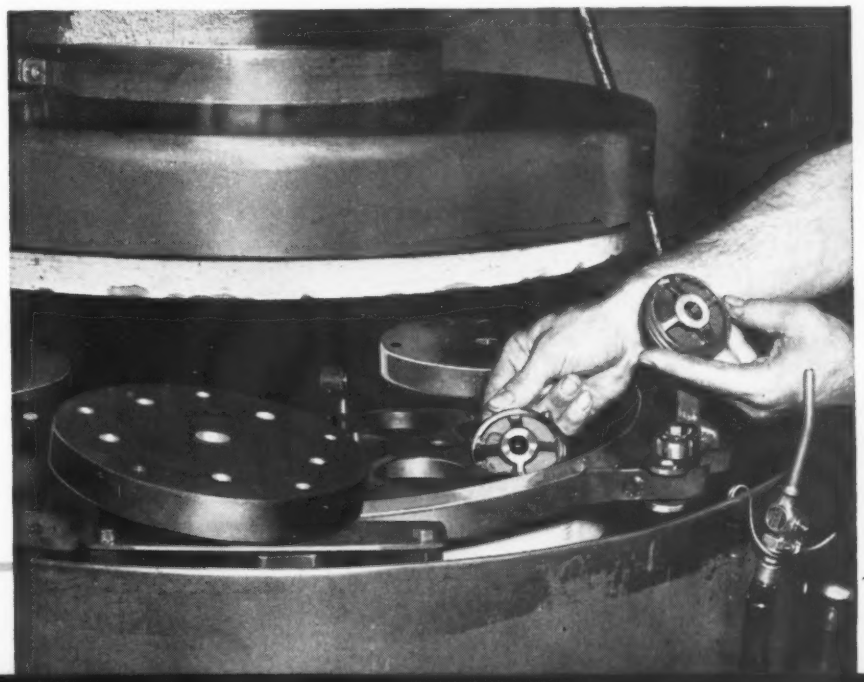


Fig. 8. Thirty or More Seal Plates, Depending upon Their Size, are Mounted at One Time in the Fixtures of This Machine for Lapping Their Lower Faces

Fig. 9. The Door-closer Valves are Held on the Magnetic Chuck of a Rotary Surface Grinder while being Ground to Height

When the part has been indexed to the third station, the central hole is rough-bored and chamfered, both the gasket seat and the side of the plate are finish-faced, and a groove is turned in the outside diameter. At the fourth station, after the bore has been finish-reamed, a carbide pilot-pin enters the hole while the outside diameter of the plate is finish-turned. A carbide-tipped, six-flute reamer with a lip 1/8 inch wide and a land 0.010 inch wide is employed. The use of the pilot pin during finish-turning insures close concentricity of the bore with the outside diameter of the plate. At the final station, shown at the top, the hub is cut off, and the plate is caught on a mandrel for unloading at the next indexing. The castings are machined at a cutting speed of 400 surface feet per minute, and are produced at the rate of 100 per hour.

The lower faces of the seal plates are given a true and extremely smooth surface by lapping on a Norton Hydrolap machine, Fig. 8. The number of plates lapped at one time varies with the size of the plate. For the largest model door closer, five plates are held in each of six fixtures on one machine. The thirty plates are held down by weights placed on top of each fixture. A production of about 75 plates per hour is obtained in this lapping operation.

A similar lapping operation is performed on one face of the door-closer valves and on the rotary piston blocks. Prior to lapping, the opposite faces of the valves are ground to height while held on the magnetic chuck of a Heald precision surface grinder, Fig. 9.

The bore, outside diameter, and one face of both the valves and piston blocks are finish-machined on Heald Bore-Matics with the set-up shown in Fig. 10. Thickness and outside and inside diameters of these parts are held within limits of + 0.0000 and — 0.0005 inch. Boring, the first cutting operation, is followed closely by turning. From 0.008 to 0.010 inch of stock is

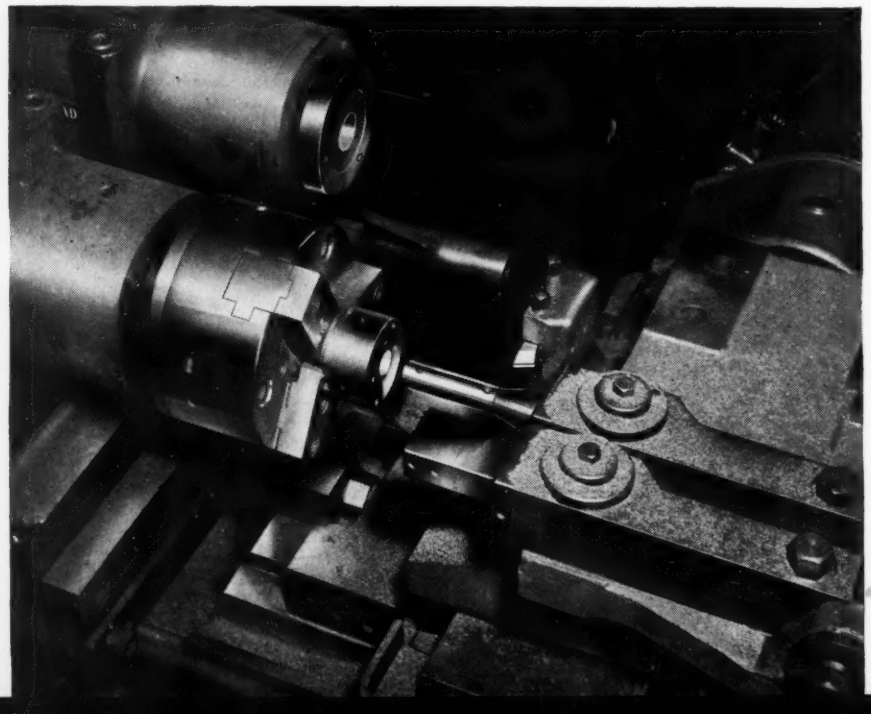


Fig. 10. Boring and Turning Tools Used for Machining the Valves and Piston Blocks are Carried on Pivoted Bars to Permit Extremely Close Adjustments

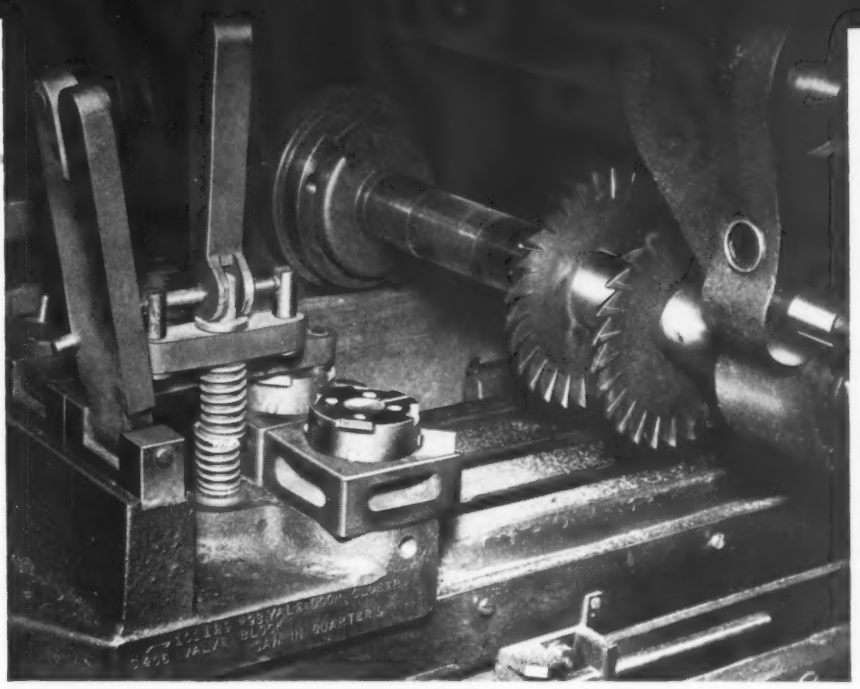


Fig. 11. A Pair of Valves are Sawed into Four Sectors Each by Means of Two Slitting Saws on the Milling Machine Arbor

removed in these operations. The holders in which the carbide-tipped boring and turning tools are mounted pivot about pins located near the cutting ends. When the opposite ends of the holders are adjusted by means of graduated dials and fine-pitch screws, the tools move only one-third the distance. This permits the tools to be adjusted in increments of 0.0001 inch.

When the boring and turning operations have been completed, the tool carriage comes to rest against a positive stop, and the tools are withdrawn. The facing tool, shown on the back of the cross-slide, is then fed across the side of the work. The part is located for these operations by means of a dovetail-shaped hub. Tapered ends of the three jaws of the chuck engage the mating taper on the periphery of the hub, thus pulling the work tightly against the locating face of the chuck. The locating hub is subsequently cut off.

After the boring, turning, and facing operations, the valves and piston blocks are cut into sectors by a pair of rotary saw blades, 1/8 inch thick, which are mounted on the arbor of a Brown & Sharpe milling machine, Fig. 11. The work is piloted over a central pin on the fixture and clamped by spring-actuated levers. Two fixtures, each holding two parts, are mounted on the milling machine table. This permits the loading or unloading of two parts while two more are being cut. The saws make four radial cuts on the valves—from the outside diameter to the bore—and five cuts on the piston blocks, the work being indexed between cuts.

Six port holes are drilled radially in the hollow spindle of the door closer within close tolerances for angular and axial location by means of the set-up and special fixture shown in Figs. 12 and 13. One No. 43 (0.0890-inch diameter) drill is employed, and the work is held in a special collet for accurate indexing and locating.

As shown in Fig. 13, the fixture consists essen-

Fig. 12. Port Holes are Drilled in the Hollow Spindle of the Door Closer by Means of a Precision Fixture which Locates the Work Both Radially and Axially

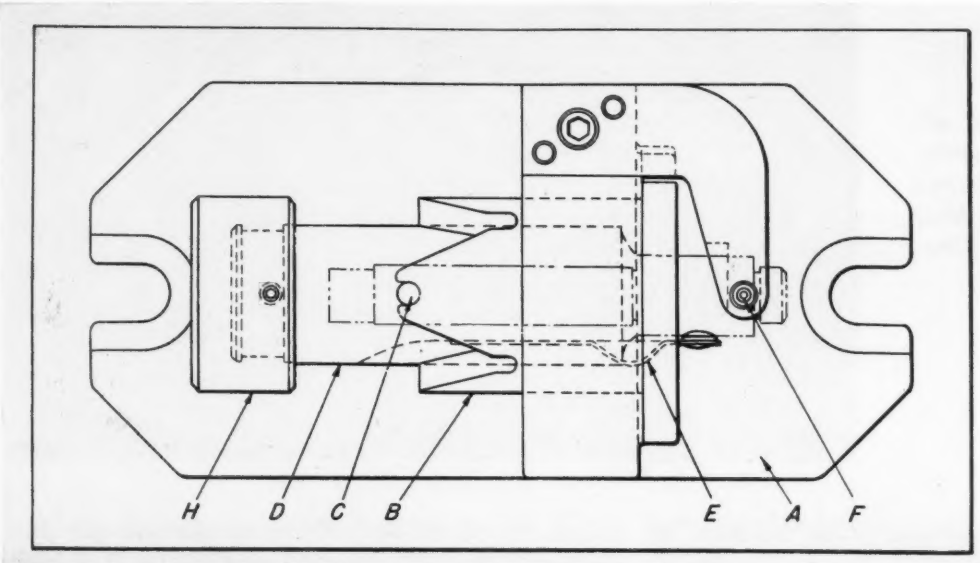


Fig. 13. Details of the Drilling Fixture Shown in Fig. 12. Indexing Pin C Locates the Work by Engaging the V-shaped Notches in One End of Bushing B

tially of a cast-iron bracket *A*, which is bolted to the table of a drilling machine. A hardened and ground tool-steel bushing *B* is held to the bracket, and is prevented from rotating by bolts and a dowel-pin passing through its flange. On the projecting end of this bushing are V-shaped notches having semicircular ends which closely fit the indexing pin *C*.

The indexing pin is pressed radially into the periphery of a hardened and ground tool-steel sleeve *D*, which holds the spindle to be drilled. Welded to the periphery of this sleeve is a spring steel locator *E* having a hardened button riveted to its free end. When the work is placed on sleeve *D*, this button snaps into a cross-hole in one end of the work, holding it in angular alignment with the indexing notches and pin and against a shoulder on the sleeve.

With the indexing pin resting in one of the notches, the drill is fed downward through bushing *F* into the work. The drill bushing is held on the fixture by means of a bracket. After each hole is drilled, sleeve *D*, with the work, is withdrawn and rotated by means of knurled nut *H* until the indexing pin is aligned with the next notch in bushing *B*. Each notch locates one hole, both radially and axially, and the six holes are quickly drilled in each spindle.

Increased Demand for Electrical Power Predicted

As a result of requirements for increased production of goods and lower manufacturing costs, the industrial use of electrical power may be doubled within the next few years, according to F. R. Benedict, manager of the Industry Engineering Department of the Westinghouse Electric Corporation.

With the increased cost of labor, industry is looking with favor upon greater electrification in order to apply more highly specialized automatic machinery to production processes. One of the processes expected to account for a large increase in power demand is resistance welding; the capacity rating of this type of equipment already in service is about 1,000,000 KVA, and the potential in the metal-fabricating industries is over three times that amount.

A review of the market for infra-red heating indicates an industry absorption capacity of about 200,000 kilowatts for this type of heating in the next ten years. The requirements of the aluminum industry for rectifier capacity alone could conceivably double within a ten-year period, the present installed capacity being 1,500,000 kilowatts.

Indications are that the power demand due to improved lighting, induction heating, electric furnaces, heat-treating, continuous annealing of metal products, and other industrial processes will be substantially increased.

Dies for Drawing Complex Shapes

Design of Dies for Parts Requiring a Two-Way Punch Action or More Than One Drawing Operation — Second Article in a Series on Fundamental Principles of Die Design

By CHARLES R. CORY
Engineer in Charge of Die Designing
Fisher Body Division
General Motors Corporation

THE first of a series of articles dealing with the design of dies for a wide variety of work was published in December, 1947, MACHINERY, page 176. That article described basic types of drawing and forming dies. In the present article, the design of dies used in drawing complex shapes will be discussed.

Parts designed with a severe crown extending in two directions or with extremely concave surfaces, and parts having two-way cavities, are very difficult to draw because of their tendency to wrinkle or tear. They may be shaped in a double-action die with an air binder; in a triple-action die; or in single-action dies, by a series of operations. In some cases, they may be drawn in one operation by a single-action die with a modified binder surface.

The part shown in Fig. 1 has a large, deep-drawn pocket *A* that extends downward and a smaller shallow pocket *B* that extends upward from the general panel surface *C*. If the double-action drawing die is so constructed that the trim line lies on the binder surface, a minimum of material will be required. However, there must be a punch action both downward and upward in order to use such a binder surface.

As shown, the lower binder member *D* is an air pad, the top surface of which is flush with the top of the bottom punch *E* when the die is open. The blank rests on the bottom binder and is forced down by the travel of the upper binder *F*, which is attached to the outer ram. During the downward travel of the air pad, pocket *B* is formed by the bottom punch, the metal pulling in as required in spite of the squeezing action of the air binder. After the outer ram has completed its down stroke, the upper punch *G* is carried down by the inner ram, thereby drawing pocket *A*. While this deep pocket *A* could be drawn by the air action and the smaller cavity by the inner ram (inverting the position of the part), such an arrangement would concentrate the greatest binder pressure at the point where it was least needed. In general, the deeper pocket should be formed by the inner ram.

The same panel can be shaped in the one-way toggle-action drawing die shown in Fig. 2. It is, however, necessary in this case to use a die with a draw wall *A* at one end and along part of the

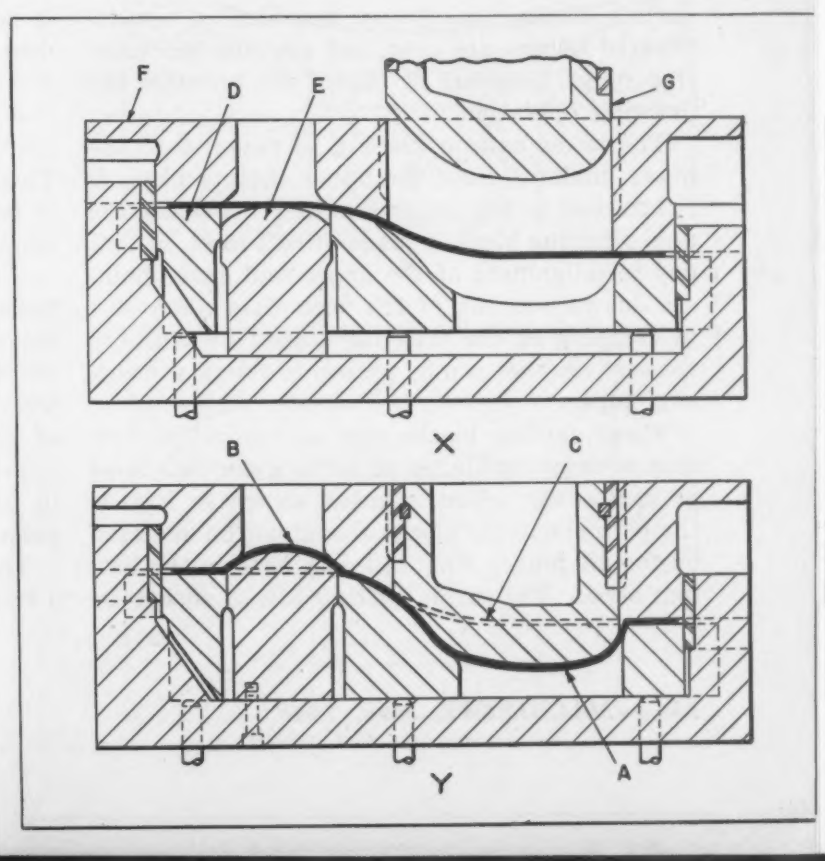


Fig. 1. A Double-action Drawing Die with an Air Binder, Commonly Used to Draw Parts with Two-way Cavities, Such as Shown at A and B

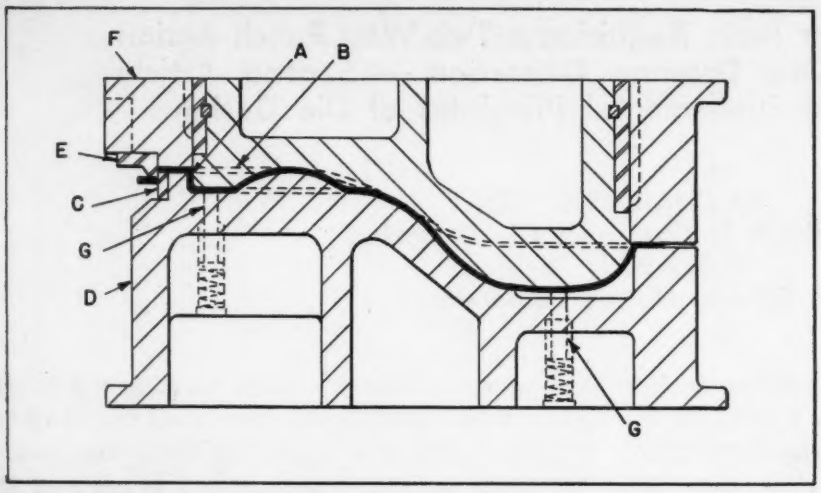


Fig. 2. When One-way Double-action Dies are Employed for Two-way Draws, it is Necessary to Use a Draw Wall A at One End and along Part of the Sides of the Panel

sides of the panel outside the trim line. Theoretically, the binder line *B* should be as high as the upper pocket, as shown. Practically, however, it can be somewhat lower, since the blank can be flexed over the upper pocket. Some wrinkles or buckles may be formed in the blank when the binders close, but unless they are so severe that they will not be pulled out during the subsequent stretching operation, they will not affect the success of the draw.

Since an excessive width of material is difficult to pull through the binder area without tearing the panel, steel cutting blocks may be incorporated in the die shown in Fig. 2 to trim the blank to the approximate drawing size. Such cutting blocks usually are provided if square-sheared blanks are used, but are not necessary if a rough blanking or cut-off die precedes the drawing operation.

The lower cutting block *C* is fastened to the lower binder *D*, and the upper cutting block *E* is attached to the upper binder *F*. Usually the upper cutting block is made of soft steel, so that any misalignment of the upper and lower binders due to wearing of the heels does not result in chipping of the shearing edges; in addition, the soft member can be peened to renew the cutting edge.

These cutting blocks can be applied to any type of drawing die. If added to a die with total or partial air action, such as shown in Fig. 1, the bottom cutting blocks should not be mounted on the air binder ring, but on a boss on the bottom shoe. The inside cutting blocks should be mounted on the top binder. The scrap will slide off the top surface of the bottom blocks if there is a taper of 20 degrees or more.

The spring plunger-pins *G*, Fig. 2, raise the drawn panel until it is flush with the front and rear binder surfaces at all points. The part can then either be pulled off the die by the rear operator or by a mechanical device. If desired, the spring plungers could be replaced with rollers on a spring-operated cradle for more easily moving the part.

Ordinarily, the blank is pushed or lifted off the stock pile at the front of the press onto the die by the front operator, but mechanical devices could be used for this operation. However, this is not usually necessary, since the drawing die does not set the pace of the line, the slowest die ordinarily being the trimming die.

A drawing die like that shown in Fig. 2 requires a larger blank size than the die in Fig. 1. Therefore the latter type of die is used except in cases where the production requirements are so low that the cheaper construction of the die in Fig. 2 will outweigh the stock waste; where the air pressure of the lower binder action of the die shown in Fig. 1 is insufficient to prevent wrinkling when the upper pocket is drawn; or where the initial drawing action hinders the flow of metal to the lower pocket. If the walls of the upper pocket are too steep, the metal is locked in position and consequently tears rather than pulls through.

The same type of part could be produced in a triple-action press with the type of die shown

in Fig. 3. A triple-action press has three rams, operating as follows: First, the upper outer ram travels down and dwells in its down position for a large portion of the press cycle; then the upper inner ram travels down and also dwells in the down position; and finally, the bottom ram travels up and then immediately returns to its original position. At about the same time as the bottom ram moves downward, the upper inner ram returns to its upper position; and a little later, the upper outer ram moves upward again.

The blank rests on the bottom binder *A*, which, in this particular case, is faced with steel inserts *B*. The bottom punch *C* is in a downward position when the die is open. The upper binder *D*, operated by the outer ram of the press, stops at the end of its down stroke and squeezes the blank with as much pressure as is required to prevent wrinkles. The upper punch *E*, operated by the inner ram, then makes its down stroke, drawing the complete panel, with the exception of the pocket that extends upward. This pocket is formed by the bottom punch *C*, which is operated by pins *F* that extend down through the die and bolster plate of the press to the bottom ram.

In order to position the draw bead in the location shown in Fig. 3, and to save as much stock as possible, the bead is made integral with the steel inserts in the lower binder surface. Such a construction is not used if there is much movement of metal out of the binder surface, because of the difficulty of replacing the bead when it is worn. However, in the case illustrated, there is little or no movement of metal in the binder—a condition that generally exists when drawing shallow panels. For instance, the blank for a panel 60 inches wide may stretch 2 inches without serious consequences. Sometimes, indeed, it is necessary to increase the binder wall height merely to stretch the metal sufficiently to set it properly.

The bottom punch is guided in the binder casting by the wear strip *G*, which is similar to the strips *H* that guide the upper punch. The bottom punch has a hardened steel wear plate *J*, against which the bottom-action pins operate. A better draw may be secured by stopping the down travel of the bottom punch at one-half the height of the upward draw. In that case, the retainer plates *K* are built up to support the punch at the required height.

It also may be necessary to add a "stress" cutter *L* to the upper punch in such a way that a hole is sheared through the center of the blank into a matching hole in the steel facing *M*, but this cannot be done if the middle of the pocket extending upward is not later trimmed out to a larger size hole.

The purpose of this hole is to allow the metal for the sides of the pocket to be pulled from the hole rather than from the outside of the blank, through the binder surface, and across the face of the panel. It is very difficult for the metal to pull such a distance without tearing, even if the binder pressure were reduced so much that

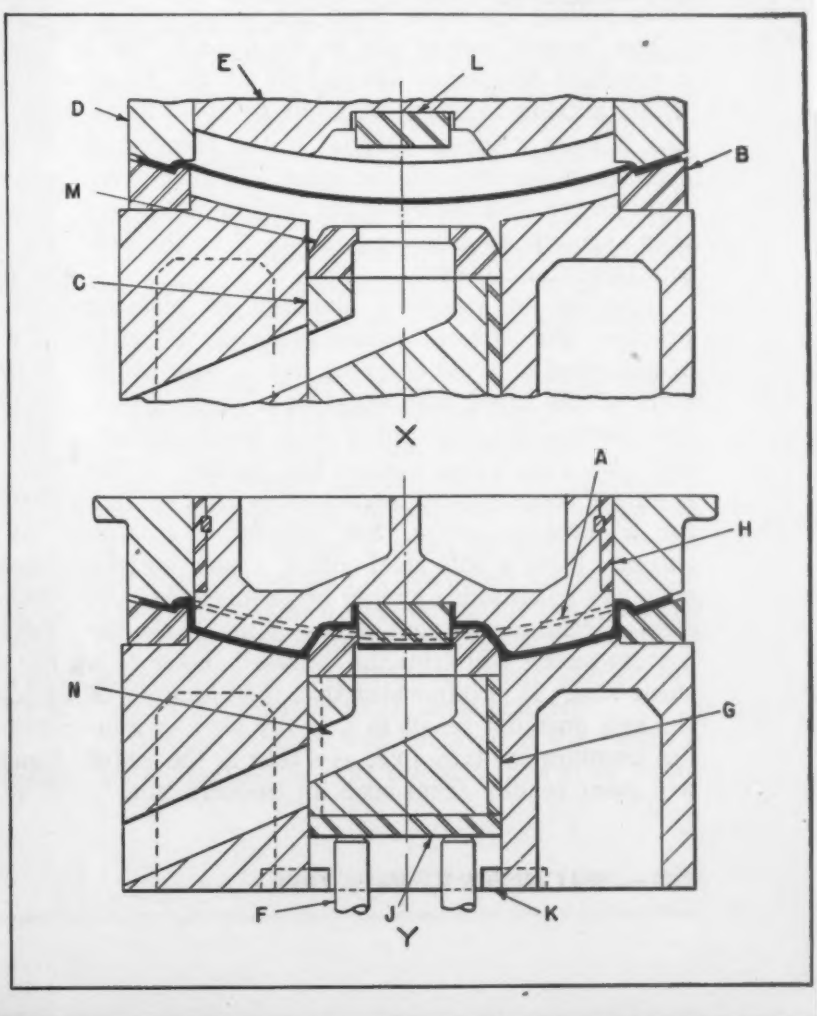


Fig. 3. A "Stress" Cutter L is Often Added to a Triple-action Die to Shear a Hole through the Center of the Blank and Thus Allow Metal to Flow from the Center to Form the Sides of the Upper Pocket

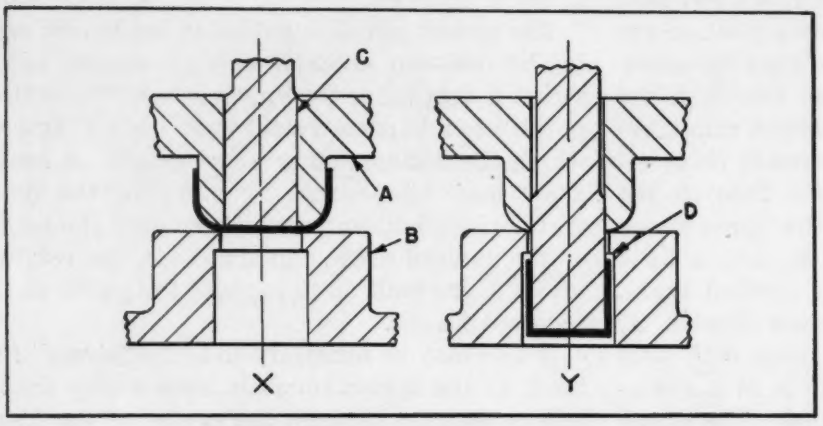


Fig. 4. The Second in a Series of Dies Used to Draw Deep Shells, Shown at the Start X and Completion Y of the Draw

wrinkles would be formed in the face of the panel.

If the depth of draw is so great as to result in excessive stretching of the metal at the edge of the blanked hole, the metal may tear at this point. Should the metal tear at the hole, the timing of the cutting operation must be changed by grinding off the "stress" cutter so as to blank the hole after part of the upper pocket is formed. The extra metal required for the draw will then come partly from stretching the metal and partly from pulling the metal from the stress hole.

The "stress" cutter can be designed to blank a complete hole or to shear only at the points where cutting is essential, so as to avoid handling a loose piece of scrap. If the opening is completely blanked out, the scrap will drop down through the steel facing of the bottom punch and then through an angular passage *N* in the bottom punch and binder.

Contrary to standard blanking or piercing practice, the "stress" cutter generally is made of soft steel to avoid chipping due to poor alignment of the inner ram usual on a toggle press. The heels align the upper and lower binders only; the punch that carries the "stress" cutter is guided merely by strips, which is good enough for a forming action, but not for a cutting action. With a soft steel cutter, a new cutting edge can be obtained simply by peening the soft steel. Then, on the next stroke of the press, the bottom punch will trim the "stress" cutter to a shear size. It is important that the blanking of the hole does not result in a heavy burr or sudden break in the trim line, as a tear in the metal will start readily from such an imperfection.

If experience indicates that a "stress" cutter is required, it can be provided in the original design. If not, the hardened steel facing *M* of punch *C* can be made with a hole in it, so that a "stress" cutter can be added if necessary. "Stress" cutters are sometimes required in the case of a double-action drawing die such as that shown in Fig. 2, although seldom in an air-action drawing die, because a panel with such severe drawing requirements is not often handled with an air-action die.

A triple-action die is used in place of a combination air and toggle die only when necessary, since it requires a more expensive press. It is employed instead of a double-action die, in spite of the additional cost, only if the general panel area adjacent to the pocket extending upward must be held to prevent wrinkling. For instance, the panel area adjacent to this pocket in Fig. 2 is not held by any binder action during the drawing of the pocket, and there is a possibility of wrinkles being formed. Whether that will be the case cannot be determined by a formula, but can be proved only by trial. When in doubt, the die should be designed with a bottom punch that can be left stationary if a try-out proves its travel to be unnecessary.

A part of the type indicated in Fig. 1 could be drawn in two successive operations, the smaller pocket *B*, extending upward, being drawn first. Pocket *A* would be produced in the second drawing die by a punch attached to the inner ram of a toggle press. In that case, the panel area including pocket *B* would be held by the upper binder. The second drawing die would not work if it were necessary for metal to pull through

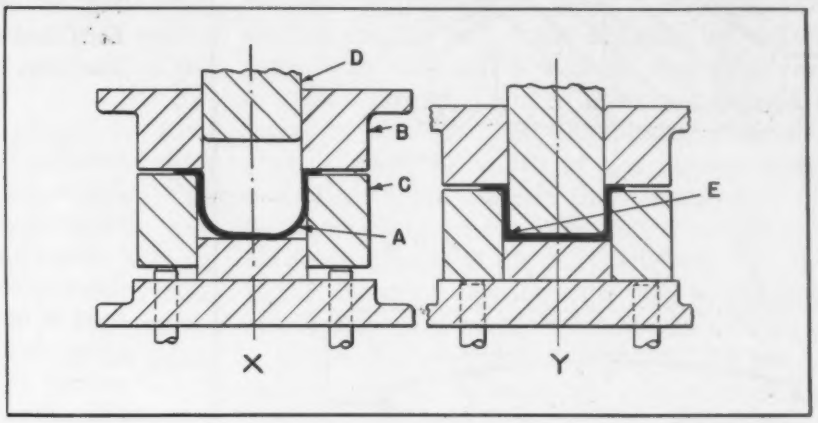


Fig. 5. The Second Drawing Die Collapses the Shell to the Specified Depth and Then Forms the Sharp Edges at Bottom of Shell

pocket *B* and if that pocket were so high or had such steep walls as to prevent such metal movement.

A deep shell can be drawn in a succession of drawing dies, starting with a shallow, large shape and progressing to deeper and smaller shapes until the desired shell is obtained. A second drawing die is shown in Fig. 4. The upper binder *A* holds the outer periphery of the bottom surface of the shell, as drawn in the first drawing die, against the bottom binder *B*. The punch *C* redraws the shell to a smaller diameter and greater depth. The shell is pushed below the sharp shoulder *D*, which strips it off the punch on the up stroke. As an alternative, spring-operated plungers can be projected horizontally into the shell cavity to strip the part.

It sometimes happens that the edge of the part is too sharp to permit drawing to the required depth without tearing the metal. Such a part is shown at *Y* in Fig. 5. The part is drawn in the first drawing die to the shape *A* with the same diameter of draw, but with a large radius at the bottom corners and a greater depth than called for by specifications. The theory is that the surface area of the part as drawn in the first die should be slightly less than the final area, so that there will be a small stretch in the second draw.

The upper binder *B* contacts the flange of the part resting on the air binder ring *C* and forces it down, thereby reducing the depth of the part and forming it into a reverse shape. During the down stroke of the punch *D* the metal is reformed to the sharp edge *E*.

The advantage of this arrangement is that the work of pulling the metal from a flat surface is accomplished by the rounded punch of the first die, and the reforming of the metal, which is relatively easier, is performed by the sharp punch of the second die.

The more difficult the draw, the more important becomes the design of the binder surface. In general, the binder surface should be such that the metal can be pulled easily from it into the punch area. Also, it should permit the metal to stretch at all points during the drawing operation, and should be such that the smallest possible blank can be used.

A part having a sweep or crown in two directions is shown in Fig. 6. The binder surface *A* in the end view *X* is a one-way sweep approximately parallel to line *B*, which represents the contour of the punch. The blank will wrap over this binder surface easily. The binder surface should not have a sweep in two directions unless the subsequent stretching of the metal by the drawing action will pull out such buckles as might be formed.

The binder edge *P* probably could be higher at the center, thus making the depth of draw *E* at the center equal to the draw depth *T* at the ends, and thereby cutting down the blank size. The success of this limited two-way sweep can be tested by trying a sheet of metal or cardboard on the pattern of the upper die member *F* when it is turned upside down. If the sheet can be forced down to the binder shape without severe buckles, the two-way sweep binder surface will probably work satisfactorily.

Sometimes stock can be saved if the punch is made smaller, so that the trim line *G* is in the

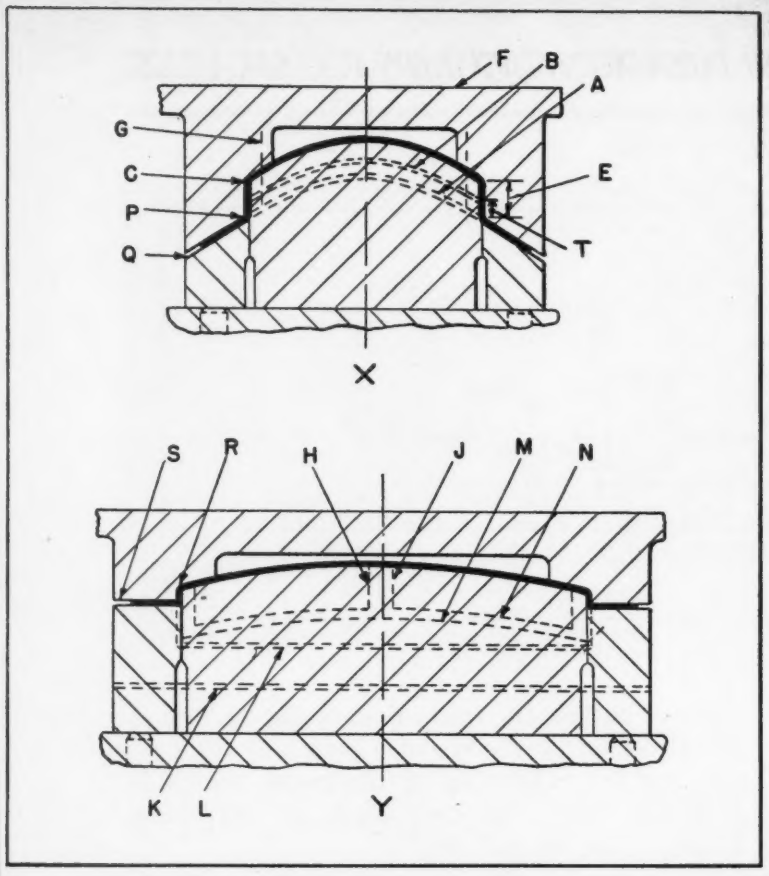


Fig. 6. Double-draw Die which Forms a Left- and a Right-hand Panel in One Blank. Part Has a Crown Sloping in Two Directions

binder surface. In the case illustrated, that would not have been practical because there would not have been enough stretch of metal without a draw wall to stretch the metal of the blank beyond its elastic limit.

In view *Y*, line *K* is a projection of the outer binder edge *Q;* line *L*, a projection of the inner binder edge *P;* line *M*, a projection of the punch edge *C;* and line *N*, a projection of the trim line *G*.

It would be possible to reduce the shut height of the die by bending the binder surface at *P* so that it would extend horizontally to the outside edge instead of at an angle to point *Q*. Any binder surface may be bent, if the bend is straight, but such a construction restricts metal flow, since the metal then makes a sharper turn between the binder surface and the punch side.

The binder surface should not be steeper than 45 degrees from the horizontal, as this would make the binder too weak and a greater shut height would be required. If the binder surface is steeper than 30 degrees, it is advisable to add a heel at the center of any long side to prevent the air binder ring from springing inward and thus reducing the blank-holder pressure and creating undue friction on the sides of the punch.

The die in Fig. 6 is a double-draw die, in that a right- and a left-hand panel are produced in one blank. The adjacent trim lines *H* and *J* are far enough apart to provide clearance for the splitting block.

For high-production parts, a double-draw die may be used even if only one part is needed. Stock is saved by its use, since one-half the amount of stock required at the center for splitting is less than the stock which would be needed at that side for a binder surface and a draw wall if single-draw dies were used. Also, the production cost of drawing and trimming two panels at once is less, since only one piece is handled instead of two, and the die cost of a double-draw die is less than that of two single-draw dies.

One limitation to the use of a double-draw die is that a deeper draw is necessary because of the greater total sweep of a double panel, and the draw is made correspondingly more difficult. Another is that the blanks for a double-draw die may not be so economically nested for a rough blanking operation as the blanks for a single-draw die, and the stock waste may outweigh the other advantages.

A variation from the principle of one-way sweep binder surfaces is shown in Fig. 7. The flange of the part at *A*, *B*, and *C* is in the binder surface. To avoid a deep draw at the three open semicircular ends of the parts, the binder surface is formed into a cone at each of the three ends; this is indicated by curve *D* and by the fact that the binder at the center *E* is higher than that at the side *F*. By reducing the depth of draw at these points, the draw is made much easier and metal is saved, not only because of the lower binder wall height *G*, but because of the shorter distance *H* between the trim line *J* and the end of the punch. This shorter distance is possible due to the fact that a smaller radius *K* can be used on the punch corner without tearing the metal. Here, again, the success of such a binder surface can only be proved by trial.

The curved surfaces *L* and *M* are the most difficult parts of the panel to draw. The metal is subject to a high state of stretch as it is pulled in two directions to form the two legs. It may be found necessary to employ a larger upper

binder edge radius *N* than specifications permit, in order to prevent tearing. A spanking operation will then have to be added to sharpen the radius of the flange.

In general, binder surfaces should be such that the depth of draw will not be greater than required for sufficient stretch of the metal. The deeper the draw, the more difficult it is to prevent tears, since the greater must be the holding pressure of the binders. Binder surfaces should not have abrupt changes, offsets, or depressions that would interfere with easy flow of the metal into the punch area.

The punch should extend beyond the trim line a distance equal to at least 1/4 inch plus its corner radius. The punch radius will vary from 1/4 inch to 1 1/2 inches, depending on the severity of the draw, the thickness of the metal, and the shape of the part. The distance between the trim line and the punch edge may have to be increased still more to provide clearance for the trimming blades. The binder wall *P* should be tapered a small amount from the vertical to allow the metal to pull in more freely.

It may not be necessary to have stock in the binder surface at any of the three ends of the draw in the case illustrated in Fig. 7. The blank should be no larger than is necessary for forming a satisfactory part. If the blank cannot be cut down to omit the end binder altogether, it may be reduced until it pulls out of the binder surface when the draw is partly finished, so there is only a locking flange of metal at the ends of the punch.

A rough-blanking die or a rough cut-off die should be provided if stock can be saved in this way, and if production warrants the additional cost. For very high production, a die that uses coil stock, with automatic feeding rolls, may be used. The rough blanking or cut-off die is made after the drawing die has been tried out sufficiently to be certain of the minimum size of the rough blank.

A rough blanking or cut-off die may be required even if no stock savings result from its use. It may be discovered in the try-out of the drawing die that the draw is not successful with the straight lines of a square sheared blank. The resistance of the metal to flow through the binder surface increases with the width of the binder surface, and therefore a difficult draw requires a minimum width of binder. For that reason, a rough blanking or cut-off die that will trim the blank to suit the draw requirements may be necessary, or else trimming blades must be added to the die.

In the dies previously illustrated, the parts, as well as the binder surfaces, were either flat or convex. The part shown in Fig. 8 is more difficult to draw, since it would ordinarily require a concave binder, which is unfavorable to drawing action. The line *A*, shown in the side view at *X*, represents the flange of the part. That line should not be used as the binder surface, since the drawing of a concave part requires more lengthwise stretch of the metal than would be possible, in order to prevent wrinkles in the flange surface. Since there is a tendency of excess metal to pile up at the center of a concave part due to the slope of the punch toward the center, it is necessary to provide a binder line which will be considerably shorter than the punch line *B*.

Such a binder surface is indicated by line *C*, which is much flatter than the punch line and

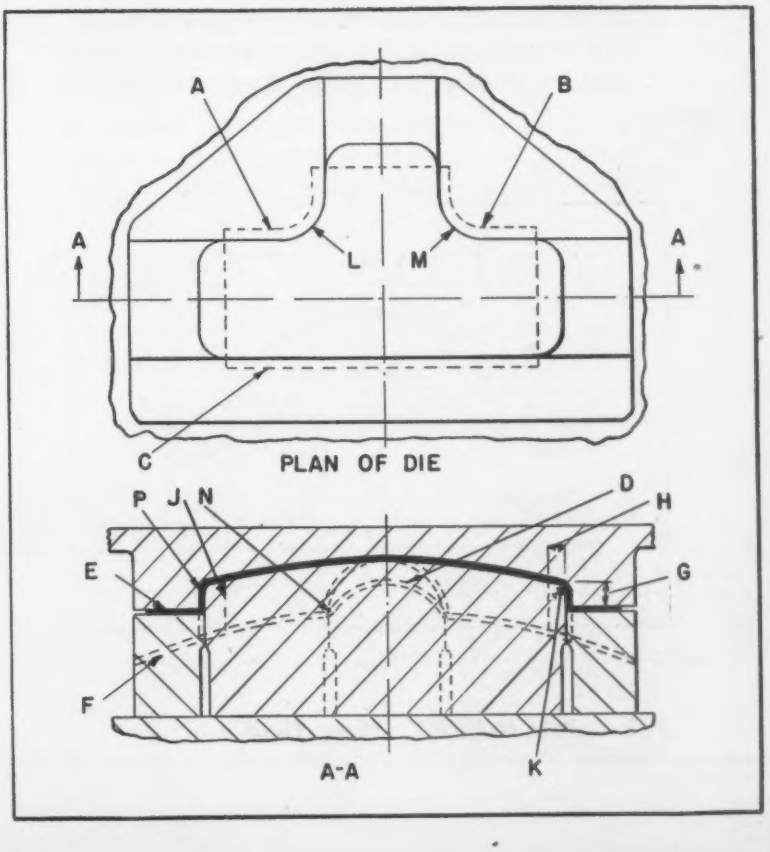


Fig. 7. Die with Binder Surface Formed into a Cone at Semicircular Ends of Part to Avoid a Deep Draw

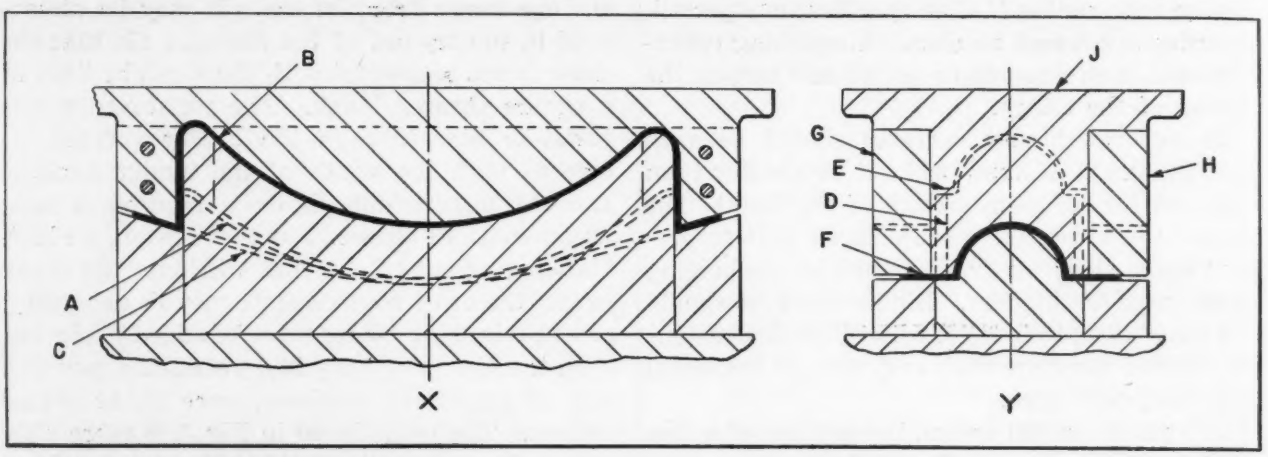


Fig. 8. When a Concave Panel is to be Drawn, the Binder Surface Should be Made Flatter than the Punch Line to Permit the Extra Amount of Stretch Required

thus will give the extra amount of stretch required by the concave part. The punch is wide enough for the trim line *D* to be located in a step *E* on the punch. This construction, although necessary, has the disadvantage of requiring more stock. In addition, since the binder surface *F* does not extend to the draw area (which is the semicircular shape of the part), there may be wrinkles in the flange surface of the part.

Side plates *G* and *H* are attached to the upper die *J* to permit the shape of the binder surface to be easily changed if, in the try-out of the die, the binder line proves not to be correct. This principle is applied to many drawing dies.

For severely concave parts, as shown in Fig. 9, it may be necessary to make the draw with the convex shape on the punch. The flanges of the part are then drawn by the prongs *A* and *B* of the punch. The side trim line is on line *H*, and the end trim line at *G*. The convex binder surface *C* is flatter than the flange line *D* in order to secure the necessary lengthwise stretch of the metal and keep the slope of the binder surfaces *E* and *F* at a minimum.

The reversing of the draw in order to obtain a convex rather than a concave binder should be used as a last resort, since it entails a considerable increase in the blank size. Also the results are rather uncertain, wrinkles developing sometimes where not anticipated.

Additional articles in this series will be published in subsequent numbers of MACHINERY.

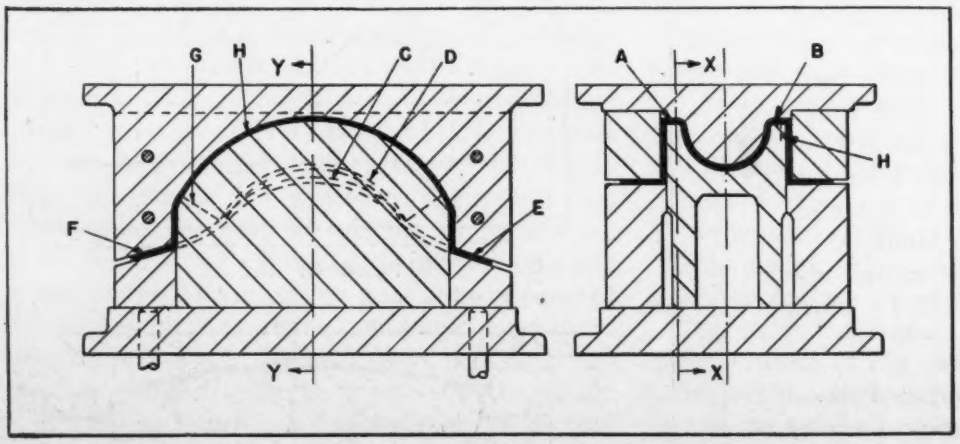


Fig. 9. Severely Concave Parts Frequently are Drawn with a Punch that is Convex in Shape. The Flanges A and B are Then Drawn by the Prongs on the Punch

Intensified Scrap Collection Would Help All Industry

STEEL shortages are still retarding full production in many branches of the metal-working industry. Directly related to steel shortage is the inadequate supply of scrap metal at the disposal of steel mills and foundries. Foundries, especially, are in an almost desperate situation because of the lack of scrap metal, which is holding down the output of that industry to from 50 to 60 per cent of its capacity.

This situation would be speedily remedied if some of the enthusiasm of war-time scrap drives could be revived. Metal-working plants scrupulously collect chips from machining operations, broken cutters, and defective work, and sell this highly necessary scrap to dealers for return to steel mills and foundries. But in almost every plant there are obsolete or worn-out machines which would serve a far more useful purpose if sold as scrap than they do in using up floor space for inefficient production. In many instances, economies would be achieved by increasing the rate of obsolescence for manufacturing equipment.

It has been estimated that the War Assets Administration alone has approximately five million tons of metal scrap on hand in the form of obsolete machines and other shop equipment. Red tape has made it difficult to obtain a release of this much needed scrap. A Senate committee is sponsoring a bill to compel the War Assets Administration to scrap carefully selected equipment, but months will probably elapse before such a law will become an actuality. Another Senate committee has advocated passage of a law compelling the return of scrap from battlefields and war-time military installations overseas. This plan might work out well eventually, but, again, months would be required for making surveys and plans alone, not to mention the delays that would be encountered in transporting the scrap to our shores. The need is immediate!

An important step toward the solution of this problem would be made if, in addition to instituting efficient scrap collection programs in their own plants, large business enterprises would promote collections in their dealers' and customers' shops. In fact, the Packard Motor Co. recently obtained several thousand tons of metal scrap from its dealers. The General Motors Corporation is initiating a similar drive directed toward its 15,000 dealers, which is expected to result in a heavy flow of scrap into the channels of commerce.

Twenty-five million tons of scrap will be required this year. Industry must help itself!

Charles O. Herb

EDITOR

Application of Bevel Gears

Uses for which Various Types of Bevel Gears are Best Suited, and Applications of the New Curved-Tooth Clutches and Couplings

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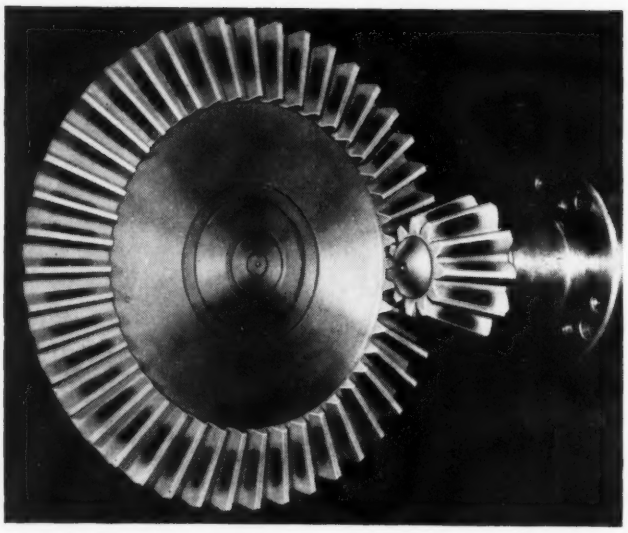


Fig. 1. Straight Bevel Gears are Used in Applications where Peripheral Speeds do Not Exceed 1000 Feet per Minute and where Smoothness and Quietness are Not of Prime Importance

BEVEL and hypoid gears are suitable for transmitting power between shafts at practically any angle, speed, or ratio of driver to driven gear. However, the particular type of gear best suited for a specific job is dependent upon the conditions imposed on the gears in service and on the type of mounting used.

Straight bevel gears, being the simplest to calculate, set up, and develop, are ideal for small lots where fixed charges must be kept to a minimum. While they are the oldest form of bevel gear, recent improvements in the speed and accuracy of cutting equipment and the addition of the Coniflex feature (localized tooth bearing) to the gears make them still first choice in many applications. They are recommended for peripheral speeds up to 1000 feet per minute where smoothness and quietness are not of prime importance. Since plain bearings may be used for radial and axial loads in these applications (although anti-friction bearings are often preferred), the use of straight bevel gears usually results in a more compact and less expensive design.

Zerol gears are spiral bevel gears with a zero spiral angle, and are manufactured on the same machines as spiral bevel gears. The advantage of zerol gears is that the teeth can be ground after heat-treatment. Zerol bevel gears have the same thrust action and tooth action as straight bevel gears, and may be used interchangeably in the same mountings. They are recommended in place of straight gears when a user has only spiral type gear cutting equipment but wishes to use gears whose action will result in less thrust than spiral bevel gears; when gears that can be mounted interchangeably with straight bevel gears are required; when the user plans eventually to change to the use of spiral bevel or hypoid gears; or when the gears are to be heat-

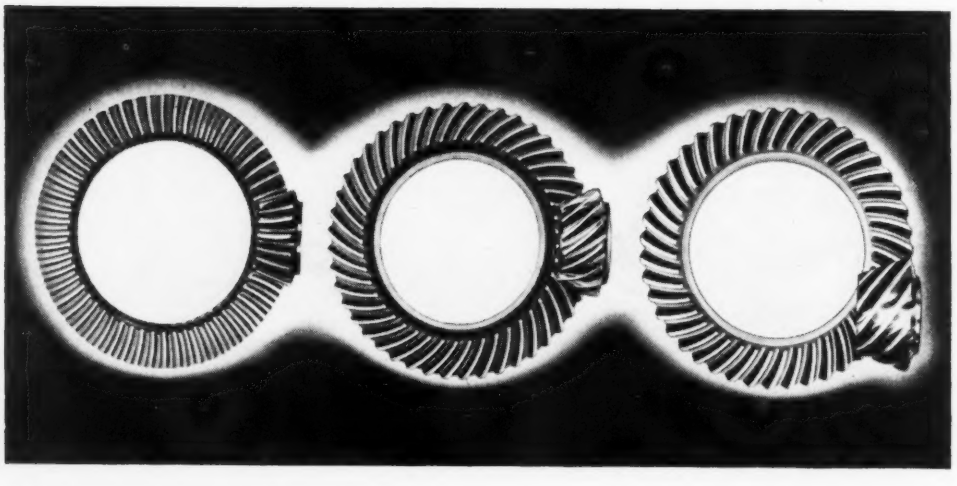


Fig. 2. (Left to Right) Zerol, Spiral, and Hypoid Gears. Hypoid Gears Provide the Greatest Quietness and Smoothness of Operation

and Curved-Tooth Couplings

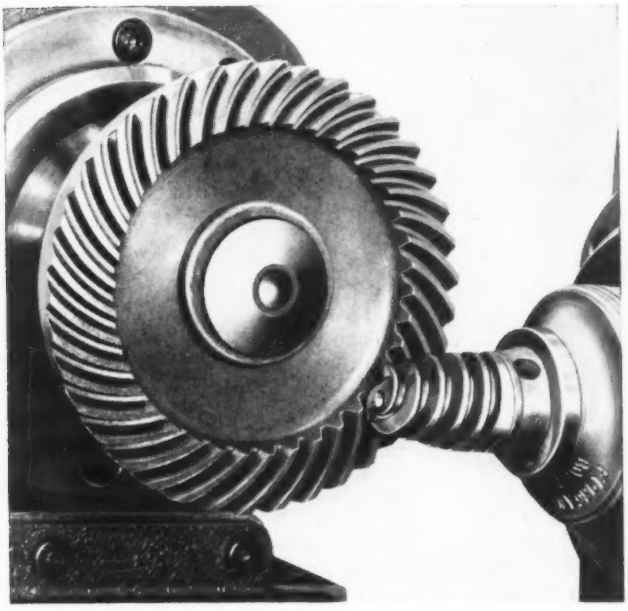


Fig. 3. Hypoid Gear Set Having a Reduction Ratio of 19 to 1. Hypoid Pinions with Only One Tooth are Practical

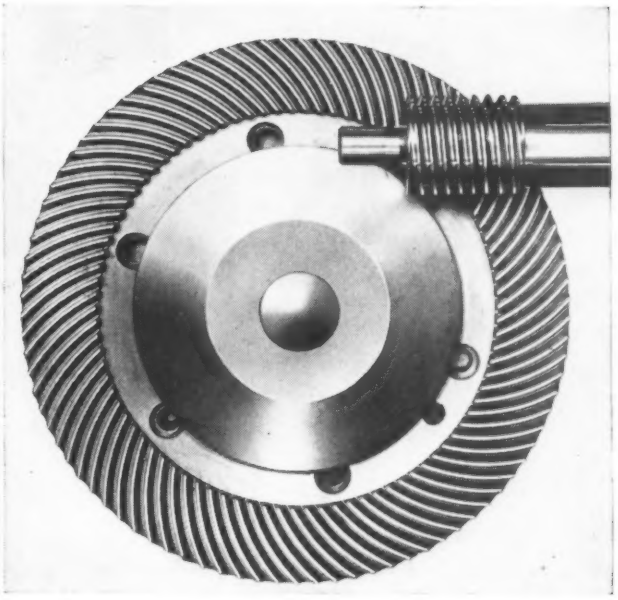


Fig. 4. Hypoid Gear Set Having a Reduction Ratio of 45 to 1. In This Set, Nine Teeth are in Contact

treated or hardened and must be ground to insure high accuracy.

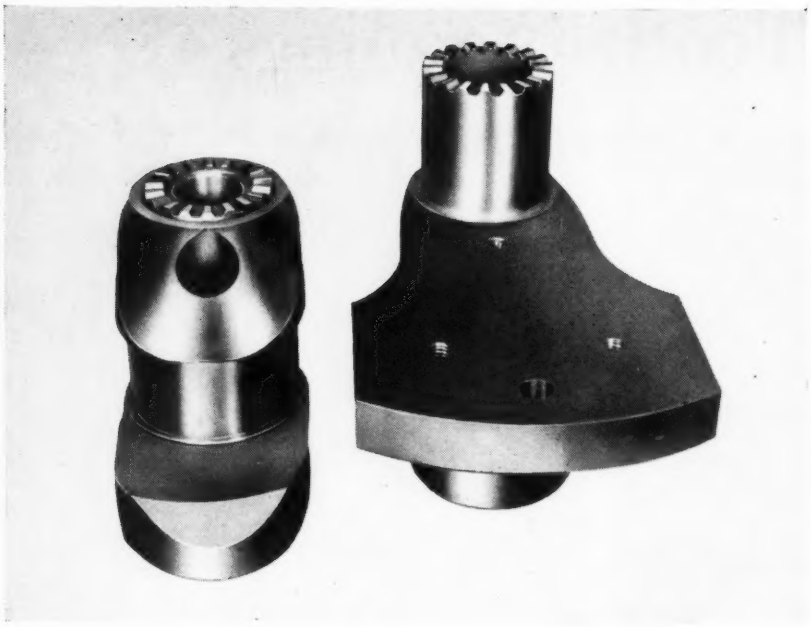
Spiral bevel gears have curved oblique teeth, so that contact begins gradually and continues smoothly from one end to the other of the tooth face. They have no more endwise sliding action than straight bevel gears; a localized tooth contact is maintained and can be easily controlled by slight changes in the radii of curvature of mating tooth surfaces. They also can be ground.

Hypoid gears are similar to spiral bevel gears. except that the pinion axis is offset relative to the gear axis, being either above or below it. With a sufficient amount of offset, the shafts may pass each other and a compact straddle mounting can be used on the gear and pinion. Hypoid gears are usually arranged so that the hypoid pinion has a larger spiral angle than the gear, with the result that the pinion is larger in diameter and stronger than a corresponding spiral bevel gear pinion. A sliding action takes place along the length of the hypoid gear tooth when it makes contact with the pinion tooth, the amount being a function of the difference in the spiral angles of the gear and pinion. As in the case of zerol and spiral bevel gears, hypoid gear teeth also can be ground.

Spiral bevel and hypoid gears are recommended especially for applications in machines where the peripheral speeds are in excess of 1000 feet per minute or the rotational speeds more than 1000 R.P.M. In many instances, they may be used to advantage at low speeds where extreme smoothness and quietness of operation are desired. When peripheral speeds greater than 8000 feet per minute are encountered, ground gears should be employed. Since the use of spiral bevel and hypoid gears results in an added thrust component, due to the obliquity of the teeth, anti-friction bearings should be employed on all shaft mountings.

Spiral bevel and hypoid gears also are recommended to reduce the over-all size of the installation when large reduction ratios are required. The continuous pitch-line contact of these gears makes it practical to obtain smooth performance with a smaller number of teeth in the pinion than is possible with straight or zerol bevel gears.

A recent trend has been toward the use of hypoid gears having very high reduction ratios. A slight modification from the usual design makes it possible to have as low as one tooth on the pinion. Gear to pinion ratios of 60 to 1 have been made, and much higher ratios are possible. In Figs. 3 and 4, are shown two pairs of gear sets, one having a tapered pinion with 2 teeth and a gear 4 3/8 inches in diameter with 38 teeth; and the other having a pinion of parallel form with 2 teeth and a gear 9 inches in diam-



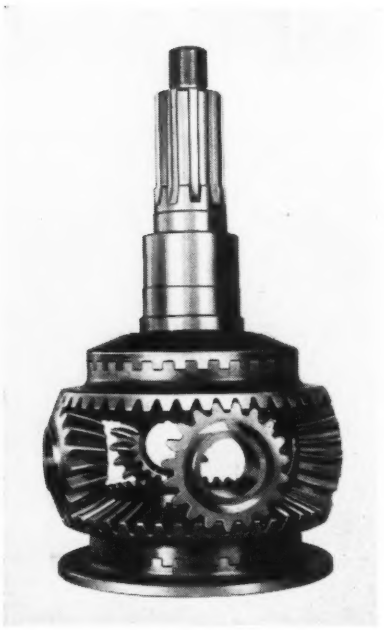


Fig. 5. (Left) One Type of Coupling Cut on a Hypoid Gear Grinder. The Parts are Aircraft Engine Crankshafts. Fig. 6. (Right) Semi-universal Couplings can be Cut on Engine Shafts to Allow for Angular Misalignments up to 2 Degrees

eter with 90 teeth. In the first gear set, the number of teeth in contact is four, and in the second, nine. The reduction ratios are 19 to 1 and 45 to 1, respectively.

This feature of permitting a large number of teeth to be in contact simultaneously, coupled with the fact that both the gear and pinion can be ground, provides a large load-carrying capacity and extreme accuracy. An actual test for 500 hours on the 2-38 combination gear set with both members made of hardened and ground steel showed an efficiency of 82 per cent. Ordinary machine oil was used as the lubricant and the tooth loading was 450 pounds per inch of face. Hypoid gears having large reduction ratios probably will be applied in increasing numbers to such devices as indexing mechanisms, speed reducers, and automotive steering gears.

Thus, hypoid gears are recommended in those industrial applications requiring extreme smoothness of operation and high gear reduction ratios; where compactness of design and maximum strength are important; or where power must be transmitted between non-intersecting shafts.

Curved-Tooth Couplings and Clutches

"Curvic" clutches and couplings recently have been developed to meet the need for maximum accuracy and load-carrying capacity in many industrial applications. The teeth of these couplings and clutches are cut and ground, or ground from the solid, on hypoid gear cutting and grinding machines. The teeth are radial and generally of constant depth. They can be produced with a wide range of pressure angles and usually with chamfered engaging surfaces. Generally, both sides of the teeth are produced in one operation by face milling cutters or cup type grinding wheels.

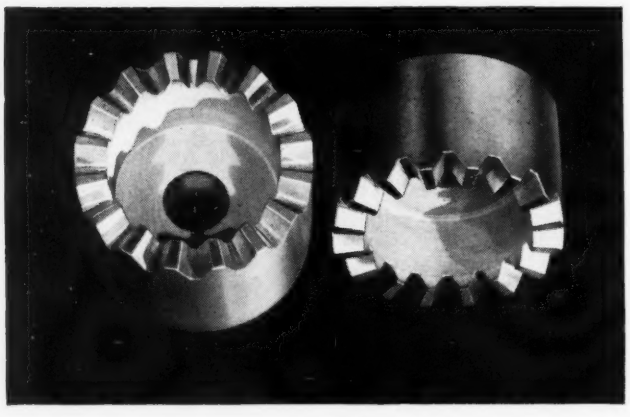


Fig. 7. A Coupling having a 30-degree Tooth Pressure Angle which is Used in Conjunction with an Electric Interlock to Limit Torque Transmitted by Power Drives

Couplings of this nature have been successfully applied to aircraft engine crankshafts, as shown in Fig. 5, since they permit a simplified design and allow the use of solid connecting-rod bearings in place of the split type otherwise required. Also, the uniformity of the teeth obtained by grinding makes possible assembly of the crankshaft from interchangeable parts. The teeth are made straight-sided—that is, with no profile curvature. A 30-degree pressure angle has been found best for providing maximum tooth surface contact, centering of teeth, and alignment of parts in this particular type of application.

The semi-universal type of coupling shown in Fig. 6 allows a slight angular misalignment to occur (as much as 2 degrees) between mating shafts, and thus provides an ideal connection between an engine and transmission gear.

Still another type of coupling (Fig. 7) is used with an electric interlock to limit the torque of power drives, such as power-operated control drives for aircraft. In this design, the two members of the clutch are held in engagement by a spring. By adjusting the spring tension, the amount of torque that can be transmitted without disengagement of the clutch can be controlled. At a given torque the load is released by an electric switch. For this application, a tooth having a 30-degree pressure angle is generally employed, since it gives the most efficient operation with the smallest spring loading.

Notching Operations Speeded up by Punch-Press Attachments

AN improved method of performing notching operations on a punch press has resulted in a 25 per cent increase in production. This method, developed by Harold A. Stran of the Glenn L. Martin Co., Baltimore, Md., employs an adapter plate and a safety guard, as shown in the accompanying illustration.

The adapter plate fits around the bolster plate of the die, and is secured to it by means of dowel-pins and set-screws. The plate contains a series of tapped holes which enable the location of the stock guides to be quickly changed. The punch, mounted on the ram of the press, has four rounded corners of different radii. By changing the location of the stock guides and placing the blank on either side or in front of the die, shapes having various radii can be notched.

Foot control of the press, which is somewhat faster than the previous two-hand operation, is now possible because of the safety guard provided around the die. The guard is made from a perforated sheet of S A E 4130 steel, bent to conform with the shape of the die and having a flange bent under and bolted to the adapter plate. A clear view of the work, with a minimum of obstruction, is thus obtained with absolute safety to the operator.

An Adapter Plate Containing a Series of Tapped Holes that Facilitate Changing the Position of the Stock Guides and a Perforated Safety Guard have Resulted in Increased Notching Production

Engineering News

Measuring Moisture by Means of an Electrolytic Film

An improved method of measuring small amounts of water vapor and gases has been developed by the National Bureau of Standards. This procedure, which can also be extended to the determination of moisture content for certain liquids and solids, depends essentially on the change in electrical resistance of an electrolytic film as it absorbs water vapor.

A thin film of liquid, which may be phosphoric acid or a solution of sulphuric acid or other electrolytic compounds in a gelatin or plastic binding material, is spread over the surface of a solid insulator between metallic electrodes. The electrolyte tends to reach equilibrium with the water vapor in the surrounding gas and to form a solution, the electrical conductance of which is a measure of the concentration of water vapor in the gas. A sensitive instrument for measuring electrical resistance and a means of calibrating the film by comparison with a gas of known moisture content are necessary.

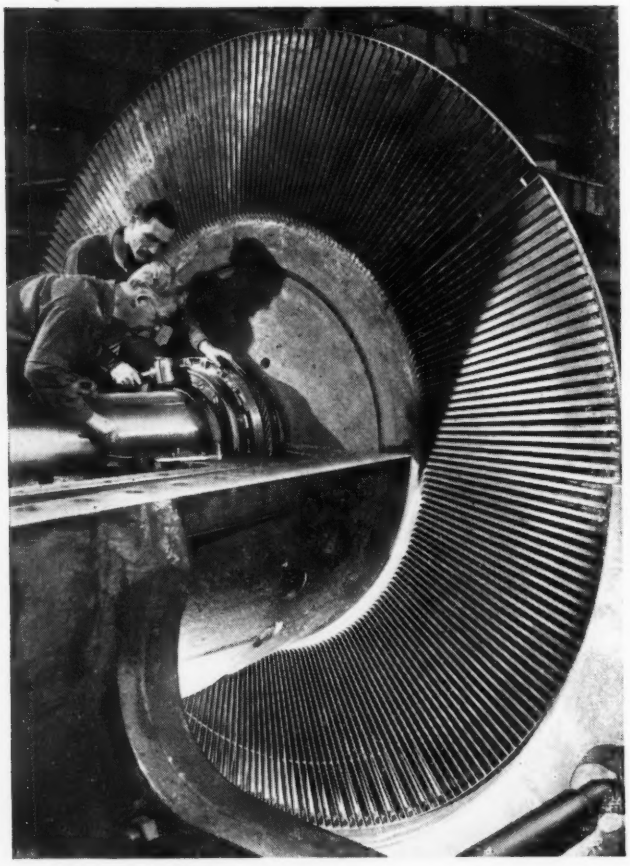
In making a determination with this apparatus, either or both of the pressures of a sample of gas of known moisture content and of the unknown sample are adjusted until they have the same concentration of water as shown by equal electrical resistance of the detecting film. The water concentration of the known sample is readily computed from moisture content and volume, and that of the unknown sample is, of course, the same.

Totally Enclosed Motors with Copper Cooling Fins

The use of copper fins extending from the stator cores of electrical motors, adopted two years ago by the Westinghouse Electric Corporation to improve motor cooling, has been so successful as to culminate in a whole series of totally enclosed "copper-fin" motors. These now encompass the range of 125 to 1000 H.P., and may be extended even further.

With this design, the accumulation of heat in the interior of a non-ventilated, totally enclosed motor is avoided simply by using copper fins, which are spaced at intervals between the steel laminations. The copper, being in intimate contact with the steel, conducts the heat that accumulates in the laminations from the interior to the exterior of the motor. Air is circulated past the copper fins by a fan on the motor shaft.

The copper fins take up about the same space as cooling air ducts on open motors, and do an equivalent job of heat dissipation. Consequently, totally enclosed motors built on this principle are much smaller than the conventional type, and in some cases can be built with the same mounting dimensions as an open motor of the same rating.



Checking the Bearing Alignment of a Rotor for a 60,000-kilowatt Steam Turbine at the Schenectady Works of the General Electric Co. This is Part of an Order for Seven Turbine-generator Sets to be Installed at the Kern Station of the Pacific Gas & Electric Co., near Bakersfield, Calif.

The Slightest Murmur Produced by the Operation of Anti-friction Bearings can be Heard by Means of a Sensitive Stethoscope

"Stethoscope" Inspects and Tests Anti-Friction Bearings

Listening for the slightest murmur in a roller bearing is the job of the industrial "doctor" shown working on a $2,000,000 line of equipment set up to scientifically destroy anti-friction bearings used in automobiles, industrial machinery, and household appliances. This laboratory machinery subjects the bearings to heavy loads at high speeds, with a view to aiding in the design of more suitable types of anti-friction bearing assemblies. An almost inaudible sound in the stethoscope indicates the presence of friction, and when this is heard, the bearing is removed from the test machinery. Inspection and testing in the anti-friction bearing industry is said to account for more than one-third of the total payroll.

Electrical Elements Indicate Minute Variations in Temperature

The efficient operation of aircraft engines, chemical processing equipment, air-conditioning systems, and many industrial indicators and controls often depends on the accuracy with which a temperature indicating device responds to small temperature variations. A step toward more accurate indication of temperature changes recently was taken with the development by the Metallurgical Division of the General Electric Co. of a line of small electrical resistance elements—Thermistors—that respond to variations as small as 1/1000 degree C.

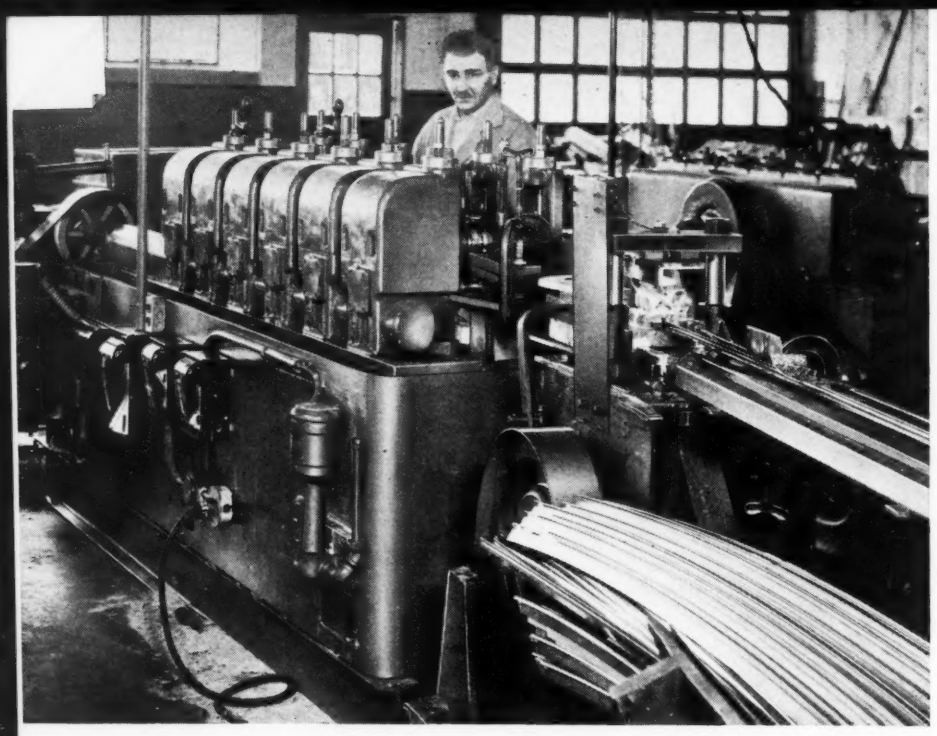
These devices are made from mixtures of semi-conducting metallic oxides, and possess a high negative temperature coefficient. They are available as rods, disks, and beads, and can be used with either alternating or direct current.

The elements can be actuated either by ambient temperatures or by internal heating. Temperature variations may be transmitted automatically to distant locations by means of systems employing the units. Thus, in addition to their industrial uses, they are finding applications in meteorological work, where they enable an operator to study several different temperatures at the same time.

Tropical Arc-Welder to be Featured at British Industries Fair

One of the exhibits of particular interest to the metal-working and fabricating industries at the British Industries Fair, which will be held at London and Birmingham May 3 to 14, will be a Diesel-driven electric arc-welding set designed especially for operation in the tropics. As the equipment will probably be used in laying pipe lines across desert countries, it is equipped with a generator that is insulated to withstand high temperatures and humidity. It is also provided with a filter to keep out sand and with an oversize radiator and cooler for lubricating oil. Instead of having removable doors, the set is furnished with steel roller shutters which can be locked to prevent loss or pilfering of parts.

The large tires on which the set is mounted are protected from the sun, and the portable current regulator has been provided with special heat dissipating qualities.



Auxiliary for Cold

The Operation of Cut-Off Machines, Rotary Slitting Machines, and Tube Welding Mills—Third in a Series of Articles on the Cold Roll-Forming Process*

WHILE the use of cut-to-length stock is necessary under certain conditions in roll-forming, for the great majority of shapes coiled stock is practical and more economical. When coiled stock is used, an automatic cut-off machine is employed in connection with the roll-forming machine. In large-scale roll-forming operations, a rotary gang slitter is also often installed, since it permits low-cost mill-width flat or coiled stock to be purchased and cut to the narrower strips required for roll-forming and other purposes.

In the early days of roll-forming, individual lengths of flat strip were always used. These were fed into the machine by hand at the rate of 25 to 30 feet per minute. Obviously, the daily production, though large compared with older methods of forming, was small as judged by present-day standards, especially when compared with the continuous forming of coiled stock made possible by the automatic cut-off machine. This machine is designed to cut off the finished shape to uniform lengths as fast as it comes out of the roll-forming machine.

There is, of course, a minimum limit to the length of pieces that can be cut without reducing the roll-forming speed, and when the length of the parts is below this limit, it becomes necessary either to slow down the speed or to set the cut-off for multiple lengths. For cutting very short lengths, such as are required for fittings, joints, and collars, it is preferable first to cut the finished shape to lengths of a few feet, and then cut these lengths into shorter pieces in a separate operation.

*The first two articles in this series were published in February and March MACHINERY, on pages 153 and 176, respectively.

Types of Cut-Off Machines and Their Operation

There are three types of so-called "flying" cut-off machines, namely, the flying shear, the circular saw, and the rotary type machine. The choice is governed largely by the shape of the section to be cut, and, to a smaller extent, by the length of section and the thickness of the material. For most purposes, the flying shear is the fastest, the most efficient, and the least expensive. It makes a clean cut without distortion of the profile, and usually also without perceptible burr.

This type of cut-off machine, one model of

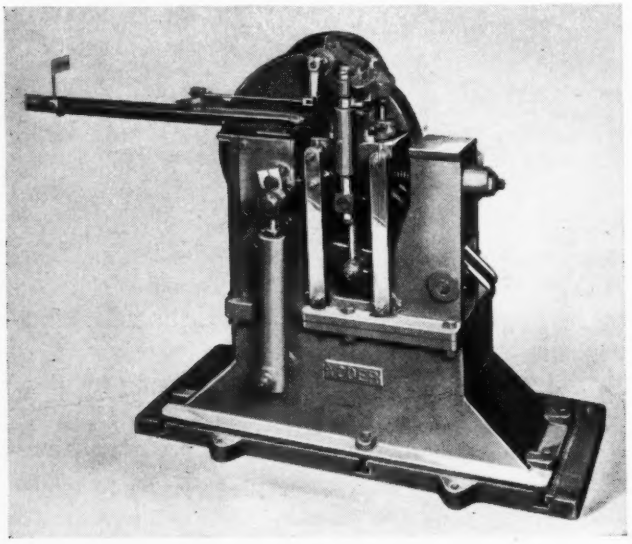
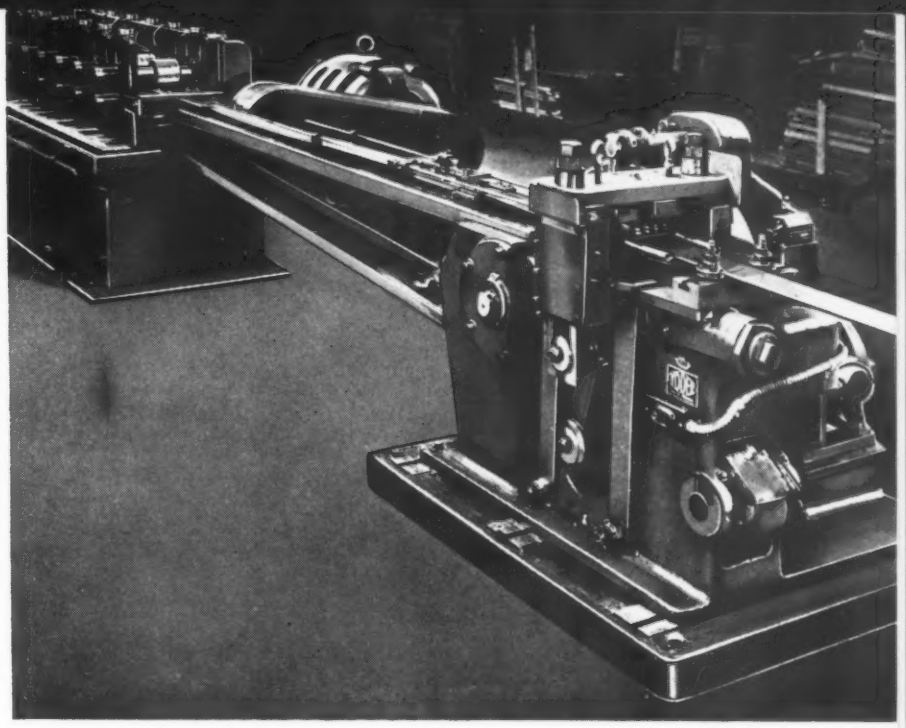


Fig. 1. One Type of Flying Cut-off Machine, Consisting of a Cutter and Die Mounted on a Table that Moves with the Stock while the Cut is being Made

Equipment Roll-Forming

By
E. J. VANDERPLOEG
The Yoder Co.
Cleveland, Ohio



which is shown in Fig. 1, consists of a cutter and die that are mounted on a movable table and are shaped to fit the section being cut. The formed section passes through the die and progresses along a run-out table until it comes in contact with a trigger that is set at a distance from the die equal to the length of stock to be cut. On being contacted, this trigger releases two compressed power springs that actuate a crankshaft, which, in turn, pulls the cutter down and moves the die table forward with the stock until the metal is severed. At this point, the die table is automatically withdrawn to its starting position and the power springs are reloaded, thus resetting the machine for another cut. The die may be in a fixed position on the table or mounted in a slide that can move forward, thus adding to the speed and accuracy of the cut.

Fig. 2. Notching Machine Used in Conjunction with a Cut-off Machine for Cutting Complex Channels or Box Shapes

The dies and cutter blades are made to suit each size and shape of part, and a change from one cutter assembly to another is quickly and easily made. There are several styles of cutter blades; the one shown in Fig. 3, being the simplest, is used whenever possible. This type is pushed straight down through the die. The style of cutter shown in Fig. 4 is suitable for channels and sections having deep variously shaped flanges or other profiles. This cutter is hinged or pivoted, and one edge is curved so that when it strikes the roller, the cutting edge is deflected diagonally downward, resulting in cleaner cutting and less wear on the blade.

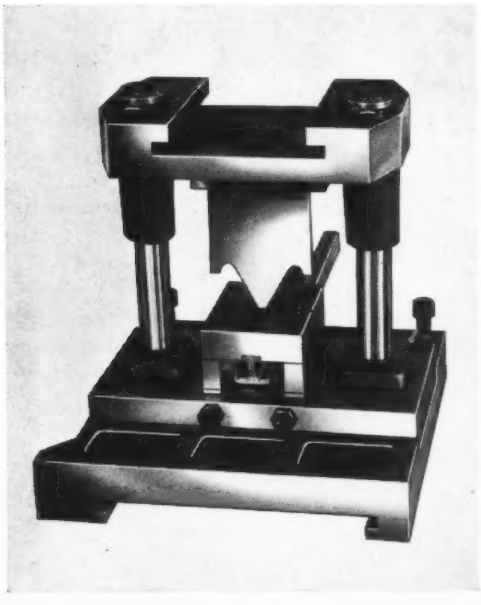


Fig. 3. (Left) Simple Type of Cutter Blade Used on Flying Cut-off Machines

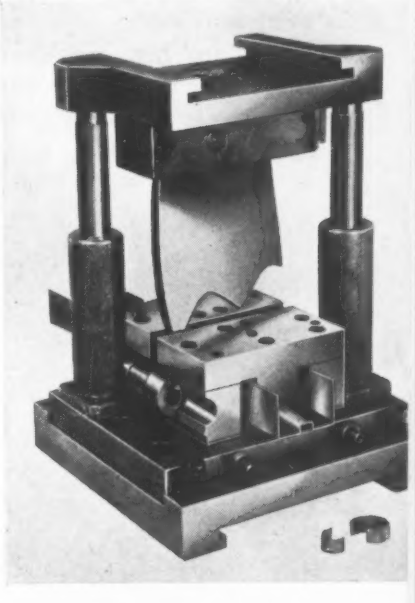


Fig. 4. (Right) Type of Cutter Blade Employed on Flying Shear Machines for Cutting Deep Channels and Sections with Wide Flanges

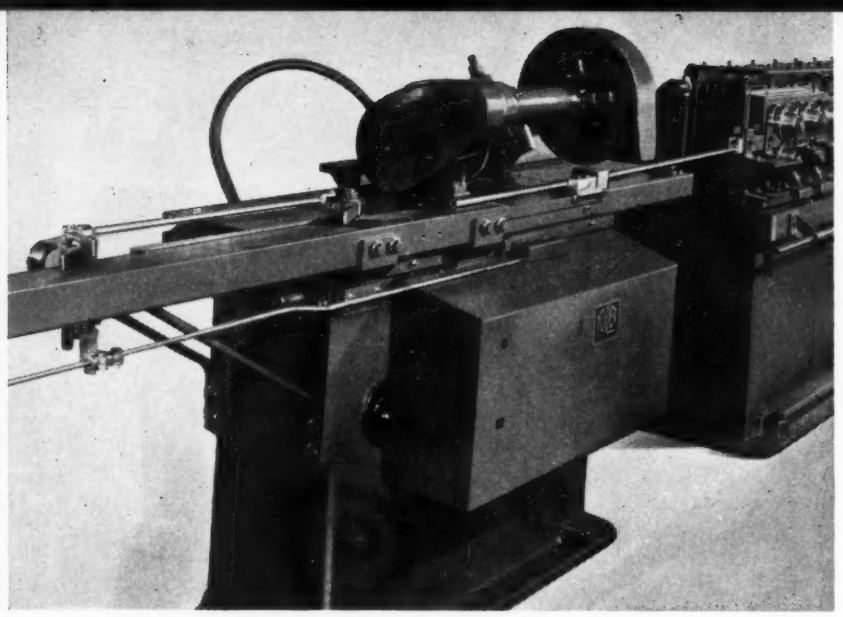


Fig. 5. The Circular Saw Type of Cut-off Machine is Especially Suitable for Heavy Sections, and is Widely Used in Tube and Pipe Mills

In order to obtain a clean cut without deformation when cutting complex channels or box shapes, two cut-off machines equipped with different dies may be necessary. In this case, the first machine is fitted with a special die for perforating or punching the flat stock at the entry end of the roll-forming machine, the perforations being made at intervals corresponding to the exact lengths desired. The final cut, severing the section, is made in the second cut-off machine after the section has been formed.

The machine shown in Fig. 2 notches flat strip stock, which is next formed into window-frame sections. A second automatic flying cut-off machine is accurately synchronized with the first one, so that the individual short lengths come off the line ready for assembly without the necessity of deburring, reaming, or restoring the profile of the cut ends.

The circular saw type of cut-off machine is illustrated in Fig. 5. In this type, also, the cutter or saw moves forward with the stock while the cut is being made. This machine will cut both light and heavy sections, but is especially designed for heavy stock that is formed at moderate speeds. The advantage of the saw type machine is that it will not deform or flatten the ends; like all saws, however, it leaves a burr. When burrs are objectionable and the thickness of the stock is not too great, the tandem arrangement just described may be preferable. Another disadvantage of this type machine is that it cannot make cuts of ornamental design, being suitable only for straight cuts.

When standard or extra heavy pipe or tubing is to be cut, the rotary type of cut-off machine is usually employed. Such a machine can be equipped with rotary disks or lathe type cutters. The lathe type cutters are preferable where a straight cut, without deformation and with minimum burr, is required. Rotary disks, although less subject to wear, cut by pressure only, and hence cause spreading of the stock, which results in the familiar constriction of the inner diameter at the ends.

Operation of Slitting Line

A standard slitting line, including the necessary uncoiler, scrap chopper, and recoiler, may be used to slit coiled stock into the widths required for roll-forming. The operation of such a slitting line is, of course, not integrated with the roll-forming production line. It is a separate operation because of the much higher speed obtainable and the fact that two or more strips are

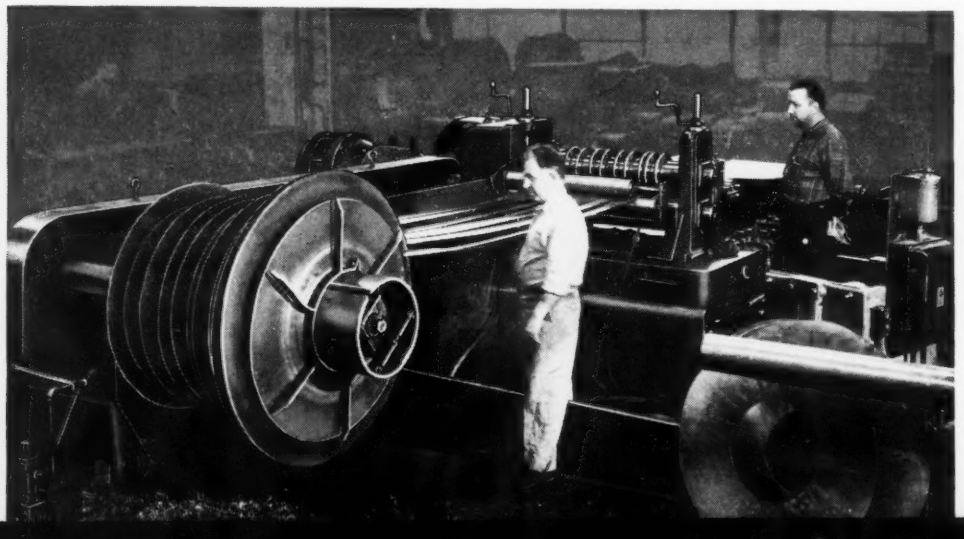


Fig. 6. As Many as Ten to Twenty Strips are Cut from Coil Stock on a Standard Slitting Line. Because of Its Higher Operating Speed, the Slitting Line is Not Integrated with the Roll-forming Machine

slit simultaneously from the mill-width stock. Not infrequently, from ten to twenty strips are cut from one coil, as shown in Fig. 6, the number depending on the kind and thickness of the stock, as well as on the size or capacity of the slitting line.

When the slitting line is in operation, a coil of stock is placed in the uncoiler at the entry side of the slitter, shown at the right in Fig. 7. An expanding drum type of uncoiler is employed to facilitate mounting the coil on the drum. For slitting heavy gages of metal, it may be necessary to include a three-roll leveler for taking the curve out of the coiled stock. A leveler is never needed for the lighter gages. The metal then enters the multiple gang slitter (shown in the center of Fig. 7) through which it is pulled by a recoiler drum, shown at the extreme left. To dispose of edge scrap, a chopper, such as is seen attached to the left side of the slitter, is used to cut the long edge strips into short pieces and deposit them in a floor box or bin.

Only two men are required for the operation of a slitting line, their time being divided between mounting the coils in the uncoiler, mounting the reels with the necessary dividers on the recoiler drum, and removing the reels when full. The operation of mounting the cutters on the arbor in preparation for slitting the metal into the desired widths requires only a few hours.

Special Tube Welding Equipment

Resistance welders are so commonly used with roll-forming machines to produce welded steel pipe and tubular shapes that any discussion of auxiliary machines would be incomplete without reference to them. In a typical tube mill, the strip first passes through a series of rolls, which form it into an open butt seam tube, and it is then resistance-welded between two vertical rolls. Guide rolls exert the necessary side pressure to force the edges together during the welding operation. Afterward, the tube is cooled, sized, straightened, and cut to length in one continuous operation.

While commonly built with an electric resistance welder for operation from a 60- or a 180-cycle power supply to produce tube or pipe from cold-rolled, hot-rolled pickled, or sand-blasted carbon steel, these mills can also be supplied with atomic hydrogen, electric arc, or gas welding equipment, as required for stainless steels, high chrome steels, and similar materials.

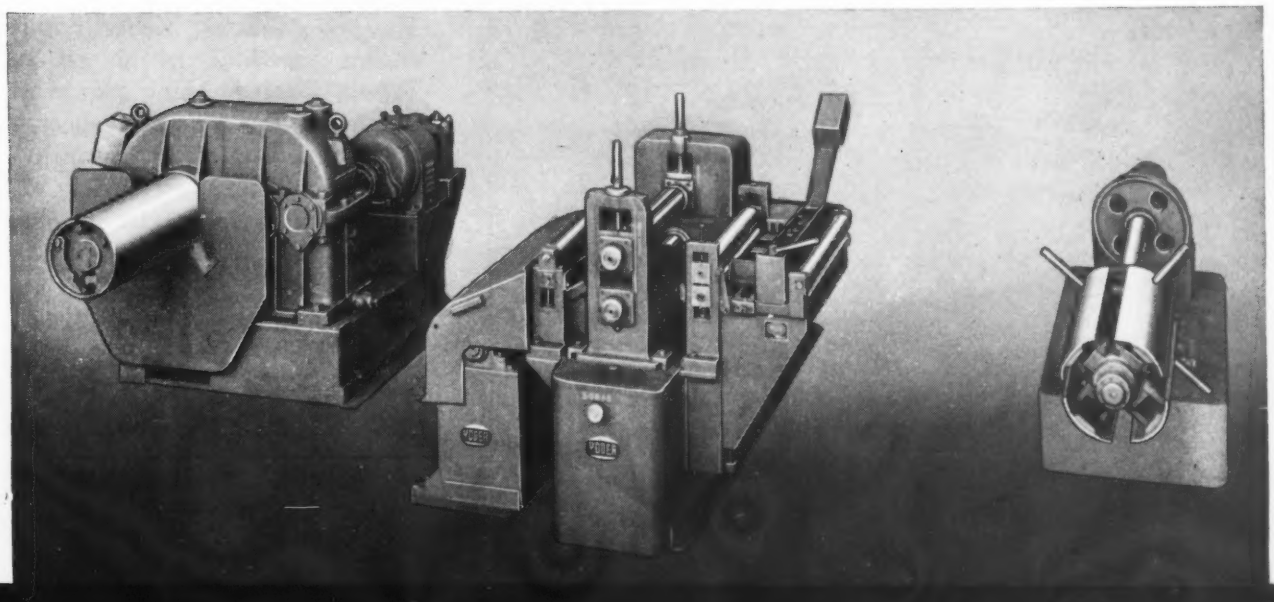
The next article in this series will discuss how to tool roll-forming machines for embossing, beveling, curving, coiling, ring forming, and the production of multiple strips.

* * *

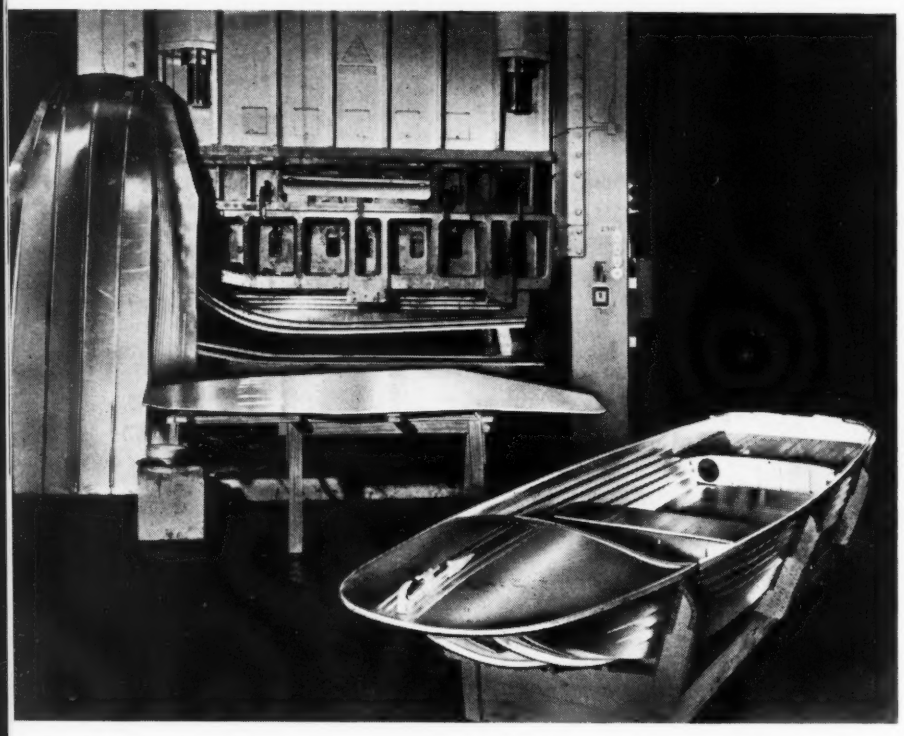
Resistance Welding Article Contest

The Resistance Welder Manufacturers' Association announces a prize contest for the best paper dealing with resistance welding submitted by individuals in industry, private or government laboratories, or consulting engineering work. The first prize will be $750, the second prize $500, and the third prize $250. A first prize of $300 and a second prize of $200 will be awarded for papers emanating from a university source—either by an instructor, a student, or a research fellow. The contest is open to anyone in the United States and its possessions or in Canada. Papers must be submitted before July 31, 1948. For further details, address Resistance Welder Manufacturers' Association, 505 Arch St., Philadelphia, Pa., or American Welding Society, 33 W. 39th St., New York 18, N. Y.

Fig. 7. An Expanding Drum Type Uncoiler (Right), a Multiple Gang Slitter (Center), and a Recoiler Drum (Left) are Usually Part of the Slitting Line



Deep-Drawing One-Piece Aluminum Boat Hulls



Aluminum Drawn Shapes, Believed to be the Largest Ever Produced, are being Formed from Flat Blanks in a Single Stroke at the Louisville Plant of the Reynolds Metals Co. These Parts Form the Hull of Aluminum Boats 12 Feet Long, 22 Inches Deep, and 55 Inches Beam

TWELVE-FOOT long hulls for aluminum boats are being drawn in one piece at the plant of the Reynolds Metals Co., Louisville, Ky. These drawn shapes, which are 22 inches deep by 55 inches wide, are formed from a flat blank in a single stroke on the 1700-ton, double-acting Clearing mechanical press shown in the heading illustration. A production of fifteen to seventeen stampings per hour is attained. One end of the part is open to permit a heavy, vertical aluminum plate to be welded to it at assembly. This plate forms the stern of the boat and supports an outboard motor.

To prove the practicability of producing such a huge part in a single draw, the Federal Engineering Co., of Detroit, Mich.—manufacturer of the die—first made a die of one-fourth the required size. A satisfactory die design was then developed by making experimental runs on the small-scale die with aluminum sheets one-fourth the thickness of the metal that was to be used in the hull.

The mammoth full-size castings for the dies, weighing more than 50 tons, were made from a special cast iron containing 0.60 per cent chromium and 1.50 per cent nickel. The castings were machined, removing about 3/4 inch of stock from all finished surfaces, on a 16-foot stroke Liberty planer and a Pratt & Whitney Keller duplicating machine, as shown in Fig. 1. Before being placed in operation, the die was inspected and aligned on a Lake Erie hydraulic spotting press, Fig. 2. The finished die weighs 30 tons.

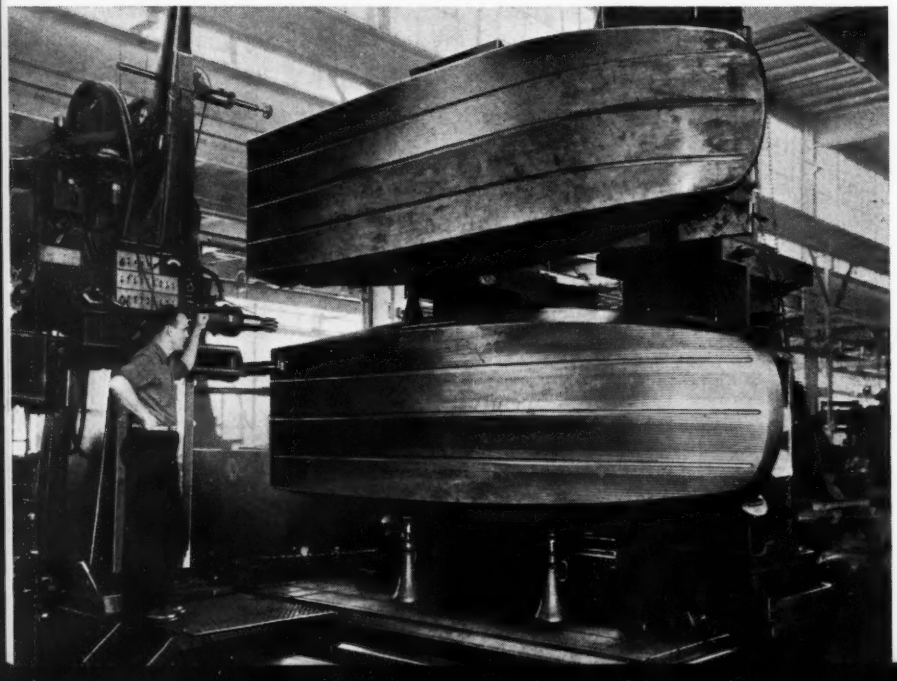


Fig. 1. Punch for Drawing 12-foot Long Aluminum Boat Hulls being Finished on a Duplicating Machine

In the drawing operation, it was necessary to form three relatively deep ribs in the bottom of the hull. A keel and two keelsons are bolted to these ribs at assembly to provide additional strength and to protect the hull. One of the major problems in designing the die was to provide sufficient metal in the center of the partially formed blank to permit forming these ribs.

A cross-section of the die, with the blank *A* partially formed, is shown in Fig. 3. Spring-actuated pads *C* extending from the lower face of punch *D* draw the required amount of metal to the center of the die for subsequent forming of the ribs.

First, the center rib is formed between the recess in centrally located pad *C* and the air-actuated pad *E* projecting from the face of die *F*. Then, as the ram continues to descend, the outer ribs are formed

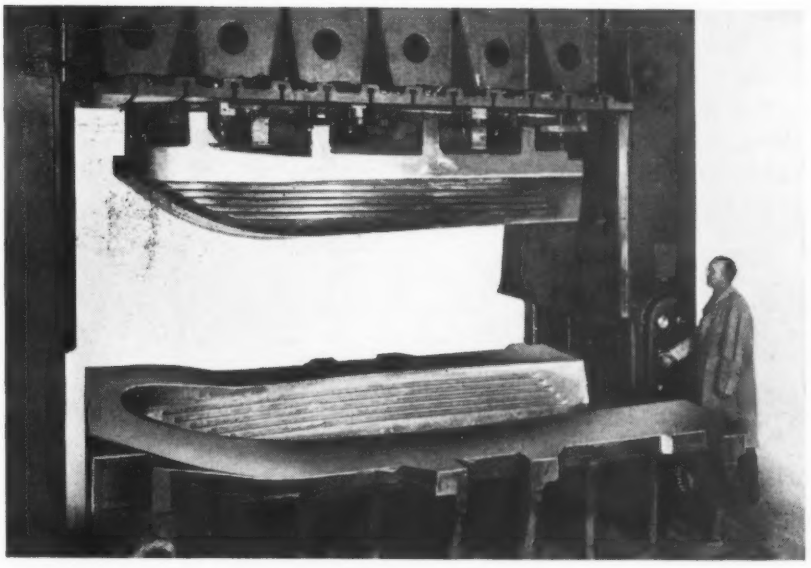


Fig. 2. (Above) Aligning and Inspecting the Die on a Hydraulic Spotting Press Prior to Placing it in Production

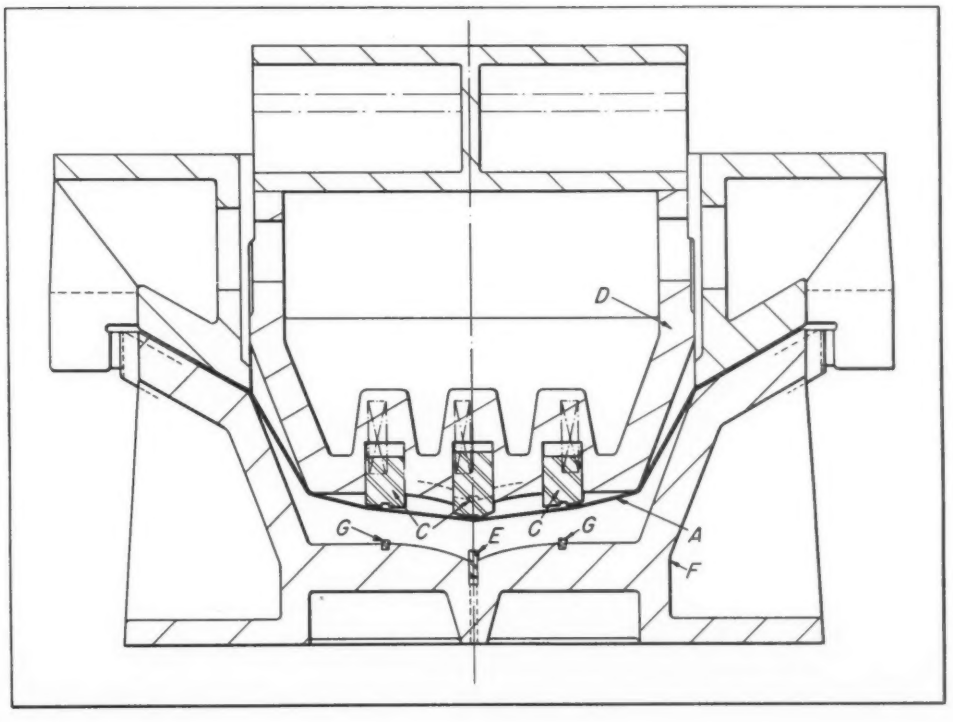


Fig. 3. (Left) Cross-section of the Boat Hull Drawing Die with Blank A Partially Formed

Fig. 4. (Below) Removing a Drawn Aluminum Boat Hull from the 1700-ton Double-acting Mechanical Press

by inserted pads *G* in die *F*. A draw bead, 5/8 inch wide by 5/32 inch high by 5 feet long, was provided on the rim of the die to grip the metal while it is being drawn.

Reynolds R361 (S A E 281) aluminum alloy sheet, 0.064 inch thick and in the W (partially hardened) condition, is used for the blank, which is 90 inches wide by 158 inches long. After the stamping leaves the die, the metal soon reaches its full-hard condition.

A compounded mineral oil containing 40 per cent paraffin is employed to facilitate slipping the blank between the blank-holder and die and to prevent scratching. The lubricant is applied with synthetic sponges to the top surface of the blank and to the lower die, between strokes.

Fiftieth Anniversary of Cincinnati Planer Co.

FIFTY years ago, Bertram B. Quillen, William H. Burtner, and R. A. Holden, all of Cincinnati, formed a partnership to engage in the manufacture of metal-working planers. This partnership continued until early in March, 1899, when a charter of incorporation was granted by the state of Ohio, at which time the corporation was named the Cincinnati Planer Co. The original plant was located on Buck St. in the West End of Cincinnati. The first planer was completed on April 21, 1899, and sixty-five additional planers were built and shipped during the same year.

In a short time, the company reached out for export trade. The first planer shipped to Europe was exhibited at the Paris Exposition in 1900, at which time the company received a Gold Medal Award from the Republic of France. Soon afterward the company entered into many exclusive dealer agreements for the sale of its products. Some of these dealers still represent the company, although they have been reorganized at times. Among these representatives should be mentioned the Motch & Merryweather Machinery Co., the Marshall & Huschart Machinery Co., the W. E. Shipley Machinery Co., and Harron, Rickard & McCone Co.

In 1904, C. H. M. Atkins purchased the Burtner interests and became president of the company. Larger quarters, better suited to the building of heavy equipment, soon became necessary, and a site comprising approximately eight acres was purchased in 1907 in the Oakley section of Cincinnati. The following year, the company also became interested in the Factory Power Co., a cooperatively owned company serving the Oakley factory group.

John H. Daum, General Manager of the Cincinnati Planer Co.

In 1910, the buildings and part of the machinery of the old plant located on Buck St. were sold and the new building in Oakley was occupied. This is still the location of the company.

In 1911, the company expanded its products and added a vertical boring mill. During the first World War the Cincinnati Planer Co. contributed greatly to the machine tool requirements of the nation by furnishing planers and vertical boring and turning mills. In 1917, the buildings were expanded, doubling the floor space of the Oakley plant. During the following years the company acquired the buildings and machinery of other companies, including the Advance Tool Co., Greaves-Klusman Machine Tool Co., Champion Tool Works, and the Cincinnati Automatic Screw Machine Co. Some of these properties were later sold.

In 1920, Mr. Atkins became chairman of the board, and B. B. Quillen became president. Five years later, the company began manufacturing planer type milling machines. During the second World War, the company contributed materially to the machine tool equipment so much needed. In 1943, the output of the company's products reached a high of $11,646,000.

In February, 1945, B. B. Quillen passed away, and George Langen, then vice-president, assumed the duties of president, a position that he occupied until March 1 of this year, when he retired. In February, 1946, the entire common stock of the corporation was acquired by Sidney G. Rose and Associates. Executives of the Cincinnati Planer Co. now include: John H. Daum, general manager; R. D. Allison, assistant to the general manager; J. Daugherty, works manager; G. LaMoth, executive assistant.

Centralized Set-up Simplifies Production Control

IMPROVED production planning and control techniques applied in the new Ashtabula, Ohio, plant of the Reliance Electric & Engineering Co. have considerably reduced the time required for the manufacture of alternating- and direct-current motors. The improvements consist primarily of a simplification of procedures, development of a central production control board, and the use of a pneumatic-tube dispatching system.

Fig. 1. A Central Control Board Simplifies Production Planning and Control of Operations on Ninety-five Individual Machines or Groups of Machines

The production control board, employed in combination with a pneumatic-tube system, enables each operation in the machine shop and fabricating departments to be controlled from a central location. This system eliminates the need for a shop dispatcher who has the responsibility of moving the job from operation to operation.

For each machine or group of machines, totaling ninety-five individual units, three pockets are set up on the board. Pocket A contains all factory orders on work in process on each machine. In pocket B are those orders that are ready for processing upon completion of the work being operated on. Pocket C holds all orders that have been released by the factory order coordinator, but are not yet ready for processing.

Fig. 2. Orders and Information are Quickly Transmitted Between Stock-room, Receiving Room, and Operating Departments by Means of a Pneumatic-tube System

Factory orders are released to the plant as their need is indicated by the control board. The coordinator places the operation, machine loading, dispatch booth, identification, and route card copies of the "Factory Order Book" in pocket B under the machine number to which the first operation is routed. Operation and machine loading copies for the remainder of the operations are placed in pocket C under the machine numbers to which the operations are routed.

Two hours before the completion of each job, the copies in pocket B are removed. The operation copy goes to the dispatch booth, the identification copy and route card to the stock-room or

receiving department for delivery of material, and the machine loading copies to pocket A, where they are placed behind the copy already in that pocket.

The pneumatic-tube system permits orders to be transmitted to the most distant station—550 feet from the control board—in twenty-one seconds. Requests for orders and dispatch of orders travel between the central control board, dispatch station, and receiving department. The dispatch station serving the machine shop and fabricating areas is centrally located in the plant, about 370 feet from the control board. Ultimately, it is planned to expand this system by providing direct lines to two stock-rooms and also to the winding area dispatch room.

Machine Tool Builders Focus Attention on Selling Problems

THE spring meeting of the National Machine Tool Builders' Association, held at the Drake Hotel, Chicago, Ill., on April 8 and 9, was devoted largely to a survey of business potentialities in European Recovery plans and of proper machine tool selling technique. "Selling the World's Best Investment" was the keynote message of A. G. Bryant, president of the Association. Mr. Bryant pointed out that the 1948 models of machine tools are at least one-third more productive than those built just prior to or during the war. Considering the more obsolete machines, including a large number that actually antedate World War I, it is doubtful if the total machine efficiency of America's industrial plant, comprising about 1,750,000 machine tools, can be as much as 65 per cent of that obtainable with present-day models.

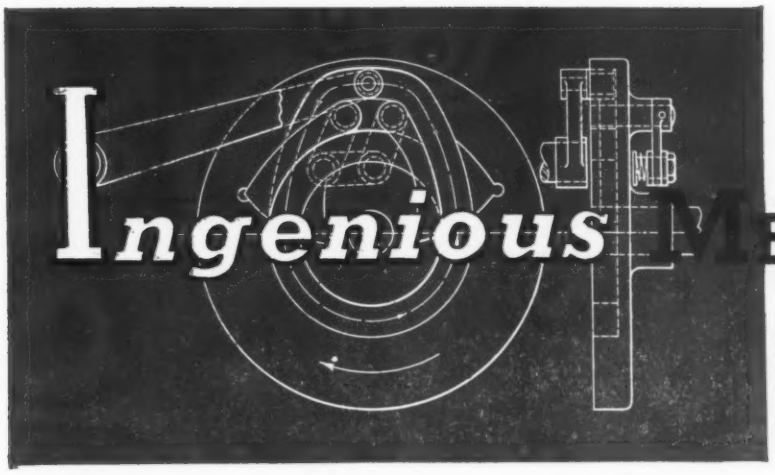
Mr. Bryant stated that there are three principal reasons for the inertia that delays needed rehabilitation of industrial plants. First in importance is the lack of understanding of the value of up-to-the-minute machine tools on the part of the "front office." Second is the difficulty placed in the path of business by the interpretations of the regulations governing depreciation in the tax laws; third is the contraction of capital available for investment as a result of Section 102 of the Internal Revenue Bureau's regulations, which requires corporations to distribute a large share of current earnings in dividends to stockholders. Mr. Bryant pointed out that this law requires distributions that may not ultimately be to the interest of the shareholders.

Other papers read during the first day of the session included "Importance of Recognizing 1948 Costs," by Arnold K. Brown, vice-president of the Brown & Sharpe Mfg. Co.; "Machine Tools in European Recovery," by M. A. Hollengreen, president of the Landis Tool Co.; and "Comments on Technological Stagnation," by William J. Kelly, president of the Machinery and Allied Products Institute.

The banquet speaker, Raymond E. Moley, associate editor of *Newsweek* and former Assistant Secretary of State, said that the machine tool industry is the keystone of permanent recovery in Europe. Mr. Moley stated: "The interest and participation of the machine tool industry in the European Recovery Program should be indispensable to its success, for the precise contribution which machine tools can make to world recovery is what will make the European Recovery Program something more than a temporary stimulant. Food, raw materials, and ordinary machinery are the crutches of convalescence. Machine tools are the means of permanent internal recovery."

At the second session, on Friday morning, Vice-Admiral George F. Hussey, Jr., U.S.N. (Retired), secretary of the American Standards Association, discussed the work of that Association, and Ray F. Ingram, vice-president of the Landis Tool Co., discussed the foreign market.

A unique feature of Friday's activities consisted of a sales panel in which various papers dealing with some phase of selling technique were read. A discussion followed. The papers were: "The Need for More Vigorous Selling," by Daniel R. Weedon, assistant manager of the Blanchard Machine Co.; "Selecting Sales Engineers," by R. L. Giebel, president of Giebel, Inc.; "Fundamentals of Machine Tool Selling," by J. C. Hebert, sales manager of the Jones & Lamson Machine Co.; "The Technique of Selling," by D. N. Macconel, president of the Machinery Sales Co.; "Charting the Sales Effort," by Bernard Lester, management consultant, sales engineering; and "Industry Teamwork for Selling," by H. L. Tigges, executive vice-president of Baker Brothers, Inc.



Ingenious MECHANISMS

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and other Devices

Electromagnetic Fluid Clutch with High Transmission Efficiency

When parallel magnetic surfaces are separated by a hydraulic fluid containing finely divided magnetic particles, the slippage between the plates can be controlled by the application of magnetic fields. This principle has been applied by Jacob Rabinow, chief of the Ordnance Mechanics Section of the National Bureau of Standards, to a new type of electromagnetic clutch that gives promise of being widely used in the automotive and general industrial fields.

This magnetic fluid clutch operates as follows: When the space between the magnetic surfaces is filled with finely divided magnetic particles and a magnetic field is established, the particles tend to bind the plates together against movement parallel to their surfaces. The magnetic particles may consist of finely divided iron which, for most applications, is mixed with a liquid, such as oil, to prevent packing and to insure smooth operation; the fluid medium has little bearing on the performance of the clutch, however. Since the magnetic field can be produced by an electric current, a very simple means is obtained for the control of the binding force over a wide range.

In Fig. 1 are shown some typical designs that may be employed for electromagnetic clutches. At *A* is shown the general arrangement of an electromagnetic clutch in which both the driven and driving members are represented as a single magnetic unit. Three methods of dividing the magnetic structure into two parts for the transmission of power are shown at *B*, *C*, and *D*. It will be noticed that the clutch shown at *B* is the type most generally employed in dry magnetic couplings, while those shown at *C* and *D* repre-

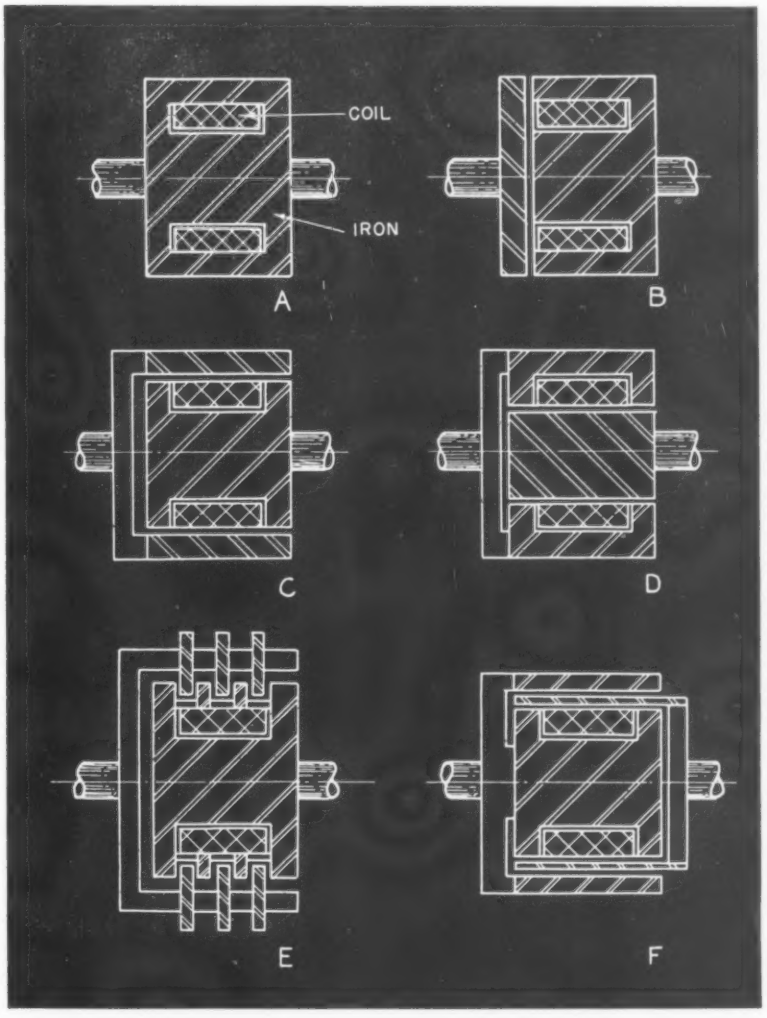


Fig. 1. Some Typical Designs that can be Employed for Electromagnetic Clutches

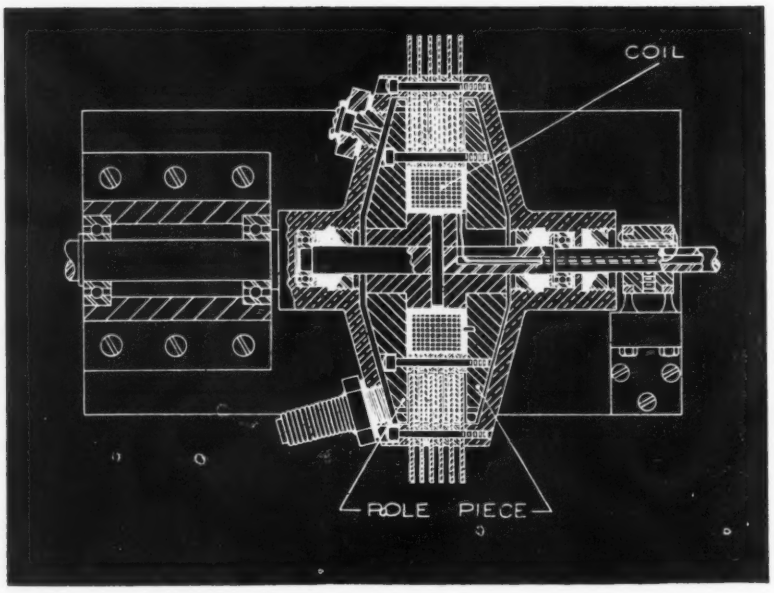


Fig. 2. A Magnetic Fluid Clutch can be Expanded to have Any Desired Number of Alternate Driver and Driven Plates. This Particular Unit is Very Compact

sent alternate arrangements that are particularly suitable for the use of magnetic powder and oil. At *E* and *F* are shown other designs in which the magnetic structure is cut at more than two places, so that parallel or multiple plate operation can be obtained.

While all these units have a single circular coil, separate coils spaced like the poles of an electrodynamic machine may be employed. The single coil is favored because of its simplicity of construction and good magnetic efficiency. There are numerous other forms of circuits that can be used, depending on the material employed, the results desired, the cost, and other factors.

The electromagnetic clutches that have been built at the Bureau of Standards thus far have been of a simple and basic form with a fixed-plate spacing. However, a unit of such design has the disadvantage of having an appreciable viscous drag at high speeds when the clutch is de-energized; in other words, it would not be the best type to use in cases where the circuit was to be thrown in and the driven member left to run free after the machine was brought up to speed.

One of the experimental clutches has a drag of approximately 1 pound-inch at 1000 R.P.M., the drag varying linearly with the speed. This drag may be minimized in several ways, such as by using a thinner mixture of iron and oil or lighter oil, by increasing the spacing between the magnetic plates, or by using the clutch at low speed. Mechanical devices that change the spacing of the plates automatically when the clutch is demagnetized are practical, and a considerable number of other expedients also can be used. The heat generated by the viscous drag can be readily dissipated.

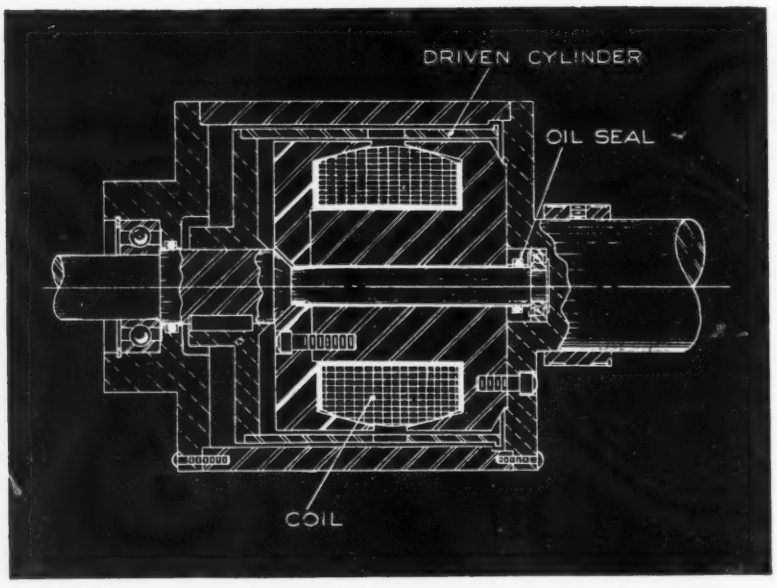


Fig. 3. If the Exciting Coil and Magnetic Iron are Made a Part of the Driving Member, Only a Very Thin Driven Member is Needed to Transmit the Torque, Thus Resulting in Low Inertia in the Driven Mechanism

Multiple-plate clutches can be designed so that the sets of plates are either in parallel or in series, as shown in Figs. 2 and 3. A clutch that uses the series gap arrangement is compact, but heat dissipation presents a special problem, particularly if the clutch is to be used continuously under constant slippage. Of course, forced air or liquid cooling can be provided.

Where low inertia is required in the driven member, as in high-speed servo-mechanism devices, it is desirable to make the exciting coil and the magnetic iron a part of the driving member as far as possible. Then only a very thin secondary plate is needed to transmit the torque. In the unit shown in Fig. 3, the magnetic circuit is made of unannealed cold-rolled steel and the end plates are made of Dural. The coil has six hundred turns of No. 18 wire, with a total electrical resistance of 3.5 ohms. The driven member consists of a 1/16-inch thick cylinder mounted on a brass disk which, in turn, is fastened to the driven shaft. Rubber rings are used as cells for the magnetic fluid, as indicated in the drawing.

An electromagnetic clutch has numerous advantages over many existing types. For example, this type of clutch is characterized by extreme smoothness of action, owing to the fact that all contacting surfaces, both of the plates and of the iron powder, are coated by a lubricant. The clutch is easy to control and requires only small amounts of electrical power. Unlike other electromagnetic clutches, wherein the torque is proportional to the square of the electric current, the torque in this new clutch, is proportional to the control current over a wide range of current values. Also, since the clutch has no axial moving parts, it is easy to manufacture; and as slippage occurs only between the iron particles and the smooth surfaces of the clutch, wear is practically non-existent. Moreover, if any of the magnetic plates are worn off, the iron dust simply adds to the powder already in the oil mixture.

The field of applications of the device is practically unlimited. The automotive application mentioned previously is the most obvious one. Unlike the fluid couplings of the type now used in automobiles, this clutch is not a speed sensitive device; if the load is below the slippage torque of the clutch, no slippage occurs and the mechanical efficiency of the unit is 100 per cent. However, the feature that makes the clutch particularly attractive for automotive application is its easy controllability, for it can be applied in automatic transmission where permanently engaged gear trains are thrown in and out of engagement by clutch, depending on the speed ratio required.

The main use of the new clutches is expected to be in servo-mechanism devices. Friction clutches previously have been used in such mechanisms, but their lack of smoothness, changes in characteristics caused by wear, and non-linearity of power transmission have caused difficulties. While servo-mechanisms can be operated by variable-speed motors, hydraulic transmissions or other devices that can be varied by a control circuit and clutches and brakes have the great advantage of low inertia to torque ratios. Electromagnetic clutches are particularly adaptable to the final elements of electro-mechanical amplifiers.

Another application is in constant-torque and overload devices, where the clutch need not be de-energized. For such a unit, permanent magnet plates might be employed.

* * *

"Designing Machinery for Arc Welding" — A New Motion Picture

A color motion picture intended to assist the designer and engineer to apply arc-welded steel in the production of many types of machinery has recently been produced by the Lincoln Electric Co., Cleveland 1, Ohio. This picture, entitled "Designing Machinery for Arc Welding," shows examples of the four fundamental elements of all machinery—namely, bases, wheels, containers, and covers. It compares various materials, and presents a study of load factors, stresses, rigidity, performance, and appearance. The film explains how welded design permits freedom of planning, speeds up fabrication, reduces weight, and enables greater strength to be obtained with less material.

This 16-millimeter sound-color film has a running time of approximately fifteen minutes, and is available without charge to industrial organizations, technical societies, schools, and colleges.

* * *

Management Course at University of Iowa

The State University of Iowa, College of Engineering, Iowa City, Iowa, announces its tenth management course June 7 to 19. The course is designed primarily for people from industry who want comprehensive training in production planning, job evaluation, motion and time study, wage incentives, plant lay-out, and related subjects. Further information can be obtained by writing Ralph M. Barnes, director of management course, University of Iowa.

Tool Engineering Ideas

Tools and Fixtures of Unusual Design, and Time- and Labor-Saving Methods that Have been Found Useful by Men Engaged in Tool Design and Shop Work

Grinding Attachment for Vertical Turret Lathe

By HAROLD E. MURPHEY, Westerly, R. I.

The printing-press impression cylinder head shown at *A* in the accompanying illustration, which is about 36 inches in diameter, was to be face-ground, and since no other equipment was available, a vertical turret lathe was adapted for the job by the addition of a special grinding attachment.

The attachment fits into the lathe turret at *B* and is clamped in position in the same way as regular turret tools. It consists of an Ex-Cell-O spindle bracket *C* and a spindle *D* on which a pulley *E* and a grinding wheel *F* have been mounted; the wheel is clamped to the spindle by means of plates *G* and screw *H*. On top of the bracket is mounted the motor *J* and its driving pulley *K*. The size of the pulleys on the motor and spindle was determined by the speed of the motor and by the size of the grinding wheel and its recommended surface speed. The grinding wheel is traversed in and out, the same as in using a facing tool. The work is shown in the illustration being held by jaws on the machine table.

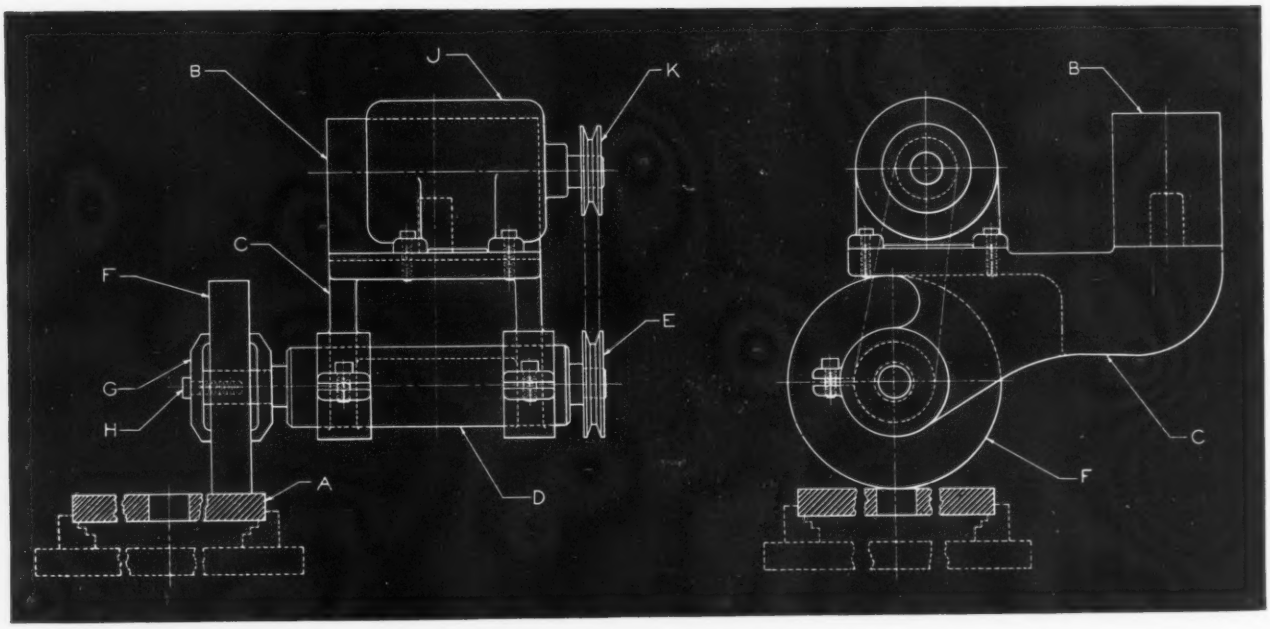
The attachment described is inexpensive and easily made. It has done a very satisfactory job on the impression cylinder head, and a similar arrangement could doubtless be applied to many other types of work.

Special Chuck and Fixture for Precision Taper Boring

By DONALD A. BAKER, Boonton, N. J.

The internal tapered surfaces of the part shown at *X* in Fig. 2 are precision-bored on a lathe at the rate of three per minute by means of the special chuck and fixtures described in the following. The part is made from seamless steel tubing which is first rough-bored and cut off on another lathe.

The chuck, which is shown in Fig. 1, consists essentially of a soft steel body *B* into which is



Grinding Attachment Designed to Fit the Turret of a Vertical Turret Lathe for Handling Large Work

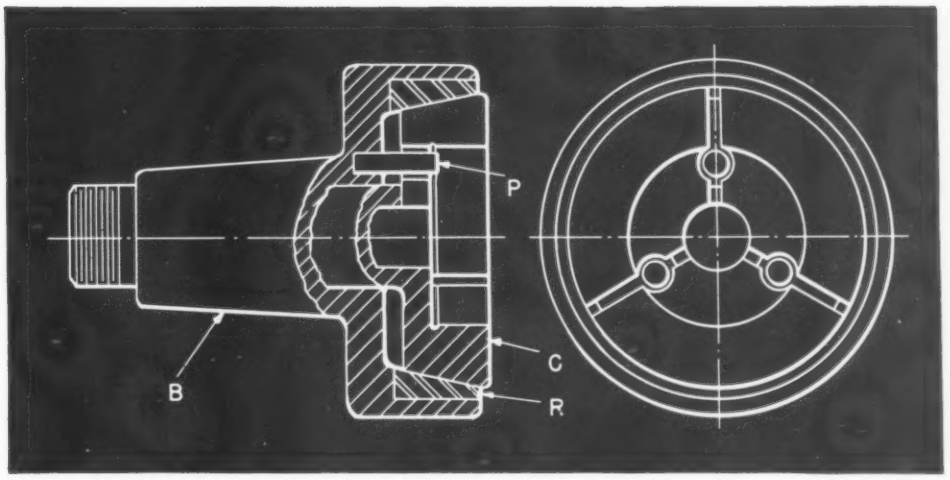


Fig. 1. Special Chuck for Precision Taper-boring of the Part Shown in Fig. 2. The Part is Located against Pins P when Collet C is Drawn into the Chuck

forced the outer race *R* of a standard Timken roller bearing. The tapered bore of the bearing race provides a sliding surface for the correspondingly tapered outer periphery of the special split collet *C*. The bore of the collet is made to accommodate the outside diameter of the part to be bored.

The split collet is opened and closed by means of a standard lever type, draw-back collet attachment. The part to be chucked is accurately located by means of the three pins *P* which pass through holes in the collet and are a press fit in the body of the chuck. These pins contact the side of the part to be bored when the collet is drawn into the chuck, thus locating the part in the correct boring position.

The boring fixture, shown in Fig. 2, consists of a ground shaft *S* which passes through two standard babbitt-lined pillow blocks *B*. The pillow blocks are bolted to a hard wood block *W*, which, in turn, is placed across the ways of the lathe and secured to the bed. A carbide tool *T* is mounted on one end of the shaft. The tool is fed into the work by means of a hand-operated lever *H*, which is connected to a hold-down bolt on one of the pillow blocks by link *L*. Lever *H* can be pivoted about pin *P*, which is a press fit in shaft *S* and keeps the shaft from being turned by the force of the cut. A wedge-shaped strip of wood *R*, fastened to the under side of block *W*, rests against the edge of the lathe way and maintains the correct angular setting of the fixture. Another wooden strip *F* is fastened to the front of block *W*, and serves as a support for lever *H* as the lever is reciprocated to feed the tool *T* in and out of the work-piece *X*.

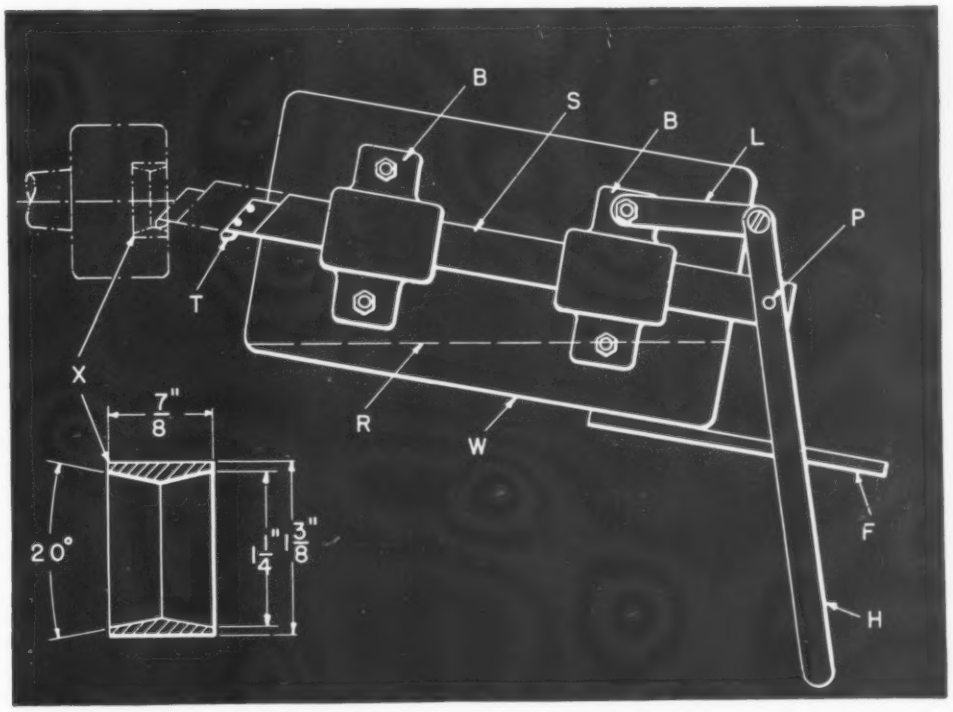


Fig. 2. Carbide Tool T is Fed Across the Tapered Surface to be Bored by Means of Hand-operated Lever H. Pillow Blocks B Act as Supports and Guides for Shaft S

THE SALES ENGINEER AND HIS PROBLEMS

By BERNARD LESTER Sales Engineering Consultant

Why Did I Lose That Order?

"There were several reasons for losing this order, but the chief one was that I did not do a good enough selling job to get it." Did you ever see a lost business report like this? I never did.

A machine tool 99 per cent complete has almost the value of a finished job. Not so with an uncompleted sale. Unless that 1 per cent is added, no order results. The time and expense involved in trying to get an order that is lost may equal that required to get one. It is a race with only a first prize. Such facts emphasize not only the importance of doing a complete selling job, but also that of putting a sale's loss to future constructive use.

Most of us like to forget a lost order. And so we should, for brooding over it destroys enthusiasm. But forgetting its loss before making a careful analysis is a mistake, because every lost order has some salvage value.

First, time well spent on an order that is lost can be capitalized with a customer. Didn't you give him competitive lines to select from? If so, you contributed to a more intelligent purchase.

Second, strength comes from analyzing weakness. A clever sales engineer learns something from the loss of every order, and uses this knowledge from then on.

Aside from abnormal conditions, such as unsuitable equipment for sale or a ridiculous price or delivery date, some of the causes for losing business are as follows:

A Late Start—This can be overcome, but it is a serious handicap. If the sales engineer knows his customer's plant, personnel, and improvement program, he knows of the need for new equipment before it becomes an inquiry. An initial informative effort will win him a favorable position in the race.

The Lack of a Simple and Direct Sales Plan—When driving out to see a customer with a sales engineer, I have repeatedly asked, "What is your plan to get this order?" Often the answer is vague or just, "Well, get in my bid, and keep after it." The efficient sales engineer will have thought out all the factors involved and arrange in his mind the various moves he will make.

Insufficient Knowledge of the Equipment to be Sold—This is probably the worst handicap of all in trying to get an order. The sales engineer's own time, as well as the customer's, is wasted in finding out correct answers to questions raised. Besides, the sales engineer loses prestige and character in the customer's mind. The sales engineer who does not know his own equipment usually does not know his competitor's either. Without this knowledge, he is feeling around in the dark. His strategy is often weak and his sales arguments dull or poorly pointed.

Past Difficulties with Equipment Sold or Service Rendered—Success breeds success. The sales engineer should not only see that past cases of trouble are cleared up, but should also overcome the bad impressions they created.

Failure to Spot and Reach the Right Men in a Customer's Organization—"I bet on the wrong horse," sales engineers have often remarked in making an honest appraisal of a sale lost. Aiming the gun is as important as shooting it. The main cause of a lost order is often the fact that the right men are not contacted.

Written Proposals Not Drawn up with Sufficient Care—Many important orders are discussed by customer executives when the sales engineer is not present. In such cases, the written proposal counts for a lot. It speaks in his absence. Bear in mind that the appearance, form, and contents of the written proposal may influence the decision.

Failure to Make Use of All Available Resources—"I should have had one of our designing engineers with me," reflectively remarked a sales engineer. "That customer's engineer is

beyond me technically—he knows that 'sales' is tagged to my name." How many sales engineers lose a job because they do not use all of the resources available to them!

Lack of Personality or Inability to Get Along with People—The lost order should present an opportunity for the sales engineer to study himself objectively. He should ask himself, "Did I lose my head?" "Was I friendly and diplomatic?" "Did I adapt my personality to the man I was with?" "How did I act when I finally lost the order—was I sullen, grouchy?" "Did I knock my competitors?" All of these things may have a lot to do with losing an order.

How His Company's Management Looks to the Sales Engineer

By A Sales Engineer In The Field

ARTICLES that have appeared on the page entitled "The Sales Engineer and His Problems" have looked at the sales engineer from behind a sales manager's desk. Let us now change our point of view and see how the typical manufacturer looks to the sales engineer. Let us see how real service and smart competitive selling techniques may be more difficult than ever to achieve today, *not* because of field conditions, but because of conditions and attitudes at the home office. The writer maintains that sales engineers are often more handicapped by lack of cooperation from their own factories than by lack of initiative, imagination, or experience in the field. Let us see why.

For nearly eight years, manufacturers have had no real sales problems. The war and the pent-up post-war demand have resulted in customers' grabbing any and all products from any and every producer. This condition has not been as good from the sales engineer's point of view as one might imagine. The effect on management has been to make it less attentive to new and unusual sales opportunities which often lead to new products. The sales engineer now finds the average management so used to having its products snatched from the shipping floor that it has become almost impossible for the management to think in terms of the service and adaptability needed to meet really competitive sales conditions.

Most manufacturers have so standardized their lines on volume items that small-volume, "special," or service type products are no longer even listed in many catalogues. The sales engineer is, therefore, forced to convince the customer that his needs are not special—that they do not differ from the next man's. If the customer cannot use the standard tool, the factory can no longer be of service because the conditions of the last eight years (unlimited demand, material shortages, and rising prices) have tended to make the manufacturer inflexible and volume conscious. Service or special items, or radical alterations of a product to suit special field conditions, can now only be secured from the small manufacturer, who has not tasted eight fat years and who is still alert to seize his share of the market from the bigger companies.

The sales engineer's management must be made to realize that each customer still insists on his own individual importance and finds it difficult to reconcile himself to using the same tools as his competitor, just because special tools can no longer be obtained. That condition is one thing in war time and another under pressure of the competition now beginning to be felt, where the minor advantages of the special tool may make a difference between success and failure.

The writer is perfectly aware of the arguments for product standardization in times of rising costs, but the manufacturer's internal problems, real though they be, must be solved before the sales engineer will again be in a position to do any really efficient competitive selling. No sales engineer who meets a universal "No!" from his own company to all requests for changes in the product or new designs can be as effective as the sales engineer who constantly receives the cooperation of his management in adapting the product to changing conditions in the field.

This writer was once naive enough to submit a plan for the reorganization of a service department where the usual triangle of the chart was

reversed, the president being shown at the bottom of an inverted pyramid and the customers at the top. One seldom, if ever, sees a management chart where the customer is shown at all, and from the sales engineer's point of view this is a serious omission. Too many field sales engineers know the die-hard attitude of management toward product changes. They have observed how virtually every suggestion sent in from a customer's plant is met at first with a cold shoulder. They also know how those same suggestions tend to crop up again (often in altered and incorrect form) as the product of some "inside" man, and how they may finally be built into the product, but all too seldom in the practical form requested by the customer.

Many managements, in attempting to improve their products, only build them more and more to suit their own plant conditions. They forget that field conditions do not always change in the direction anticipated by managements who are relatively remote from the actual conditions of use. Dollars are spent, too, in trying to convince customers how right an "inside"-originated design is thought by the management to be. If the customer refuses to be persuaded, the sales engineer is put in the unfortunate position of having to criticize his company's product, even though he may be doing nothing more than interpreting field conditions, which the management is no longer particularly anxious to see.

Management should realize that field suggestions almost always originate with the customer. However they may sound in a report, they are the customer's ideas. But if the individual customer does not seem big enough to the volume-conscious manufacturer, such suggestions are tabled as being critical, too expensive, or merely the ideas of some crank. Suggestions from sales engineers should be considered with just as much respect as suggestions for plant efficiency from production employes. Certain sections of the country are notably more progressive and improvement-minded than others, and the sales engineer located in an aggressively minded industrial center is at a constant disadvantage when representing a conservative, die-hard company which can only see local ways of doing things.

It is a mystery why so many managements are reluctant to capitalize on the practical knowledge of the sales engineer. Undue emphasis in many cases is placed on theoretical engineering of products built and tested under laboratory conditions. The only real and final test of a product is the test of use. Progressive managements, therefore, should look to the sales engineer for the ideas that will keep them in business under truly competitive conditions. One of the best assets a company can have is an alert and progressive sales engineer, provided that the company is able to take advantage of his practical knowledge of customer problems. The truly successful concern is not afraid of new ideas advanced by their salesmen, but perceives in them the key to future sales successes.

* * *

New American Standards for Taps and Lathe Spindle Noses

Revised standards for taps with cut and ground threads and for spindle noses for toolroom lathes, engine lathes, turret lathes, and automatic lathes have recently been adopted by the American Standards Association.

In the case of the tap standards, a number of minor changes which have been adopted by industry since 1939 have been added. The new standards include a table for marking taps, and the thread dimensions, over-all dimensions, and tolerances for cut and ground thread hand taps, machine screw taps, tapper taps, nut taps, pulley taps, boiler taps, mud or washout taps, staple taps, and pipe taps.

In so far as the standards for spindle noses are concerned, several new sizes have been included and minor modifications made in existing types. Types A, B, and D spindles are identical with those given in the 1936 standards, except that the under-cut at the large end of the taper has been improved. Type C spindle noses have been discontinued, since none of these types, as far as is known, have been put in production, and no need is foreseen for them in the near future. Two smaller sizes of Types A, B, and D spindle noses have been added, and one larger size of Type A and B. Five sizes of Type L spindle noses have also been added as an alternate standard for engine lathes.

The dimensions of all of these spindle noses, as well as the dimensions of the backs of mating chucks and spindle fixtures and the dimensions of checking gages, are included in the standards. Originally developed for lathes, the spindles have been used in internal grinding machines and thread grinders, and may be applied wherever chucks or fixtures must be mounted accurately and rigidly on revolving spindles.

* * *

The Westinghouse Electric Corporation adopted 7755 suggestions from a total of 20,000 ideas received through its employe suggestion system in 1947.

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

New Multiple-Wheel Cylindrical Grinder Developed by the Landis Tool Co.

The Landis Tool Co., Waynesboro, Pa., has developed a multiple-wheel precision cylindrical grinding machine. This new machine will swing work up to 10 inches in diameter, and the grinding wheels can be spaced over a maximum distance of 30 inches. The standard wheel diameter is 36 inches and the worn wheel diameter is 26 inches. The multiplicity of grinding wheels which can be carried on the spindle between bearing supports provides means for grinding several diameters simultaneously. Wheels can be profile-dressed for finish-grinding tapers and odd shapes, as well as for straight cylindrical work.

Typical examples of grinding work handled on this machine are shown by the operation diagrams in Fig. 2. Diagram *A* illustrates the use of four grinding wheels for grinding the four main bearings of a camshaft simultaneously. With this arrangement, 0.025 to 0.030 inch of material is removed from the bearings by rough grinding at the rate of ninety shafts per hour. Finish grinding, requiring the removal of 0.010 inch of stock, is performed at the same rate.

Diagram *B* illustrates the arrangement employed for grinding three bearings of a transmission shaft which are held to size within a tolerance of 0.0005 inch; at *C* is shown the use of three wheels for grinding a roll; while the enlarged-scale diagram at *D* indicates the method of using a truing diamond for dressing the middle wheel. The wheels are dressed by a table type diamond dresser, the table being traversed hydraulically. In order to dress the wheels to different diameters or shapes, depending on the workpiece, the diamond bar is made to follow profile bars mounted on the front of the bed. These bars are adjustable for accurate dressing. A rapid traverse of the diamond bar is provided between wheels, in order to reduce dressing time to a minimum.

To remove the wheels when worn, the fender and wheel-feed arm, both pivoted at the rear, are swung up out of the normal position. By releasing hinged clamping blocks, the entire spindle and spindle bearing assembly can be lifted out of the machine. Retaining rings and wheels can then be easily removed without disturbing the bearing assembly. The 12-inch wheel hole allows the wheels and retaining rings to be slipped over the bearing housing.

Wheel feeds are hydraulically operated. Rapid feed advances the wheel to the grinding position, and slow feed moves the wheel-base slowly for grinding. The slow feed and carriage traverse rates are controlled by throttle valves at the front of the machine. Operating controls, such as hand traverse, traverse start-stop, in-feed lever, and carriage reversing and electrical push-buttons are all grouped at the oper-

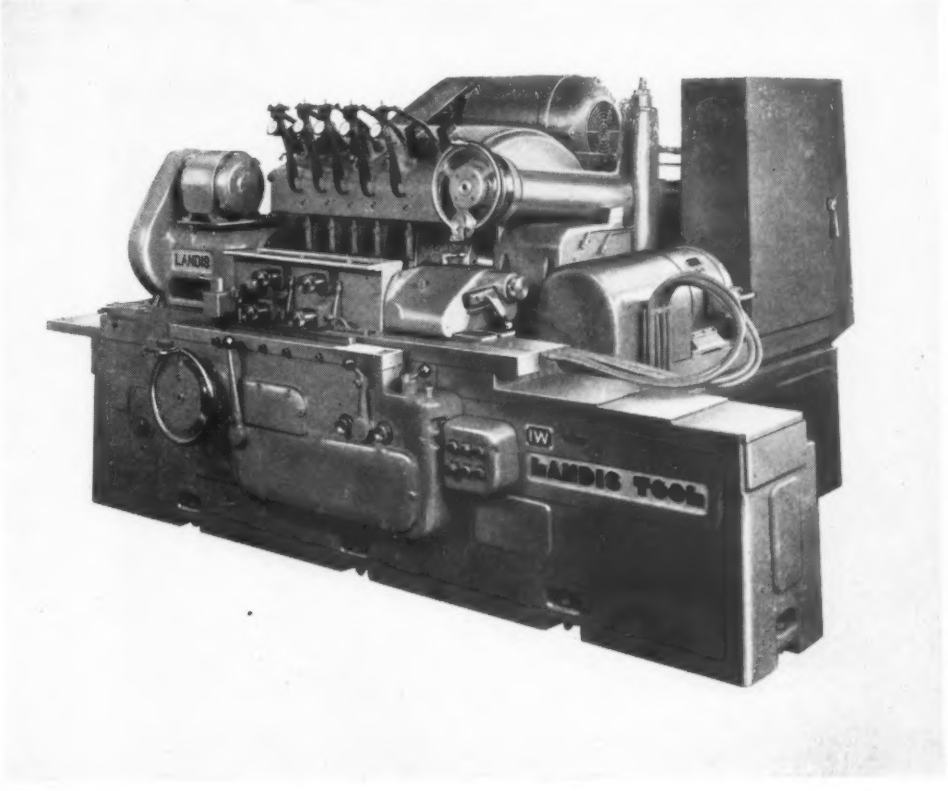


Fig. 1. Multiple-wheel Precision Cylindrical Grinder Brought out by the Landis Tool Co.

To obtain additional information on equipment described on this page, see lower part of page 220.

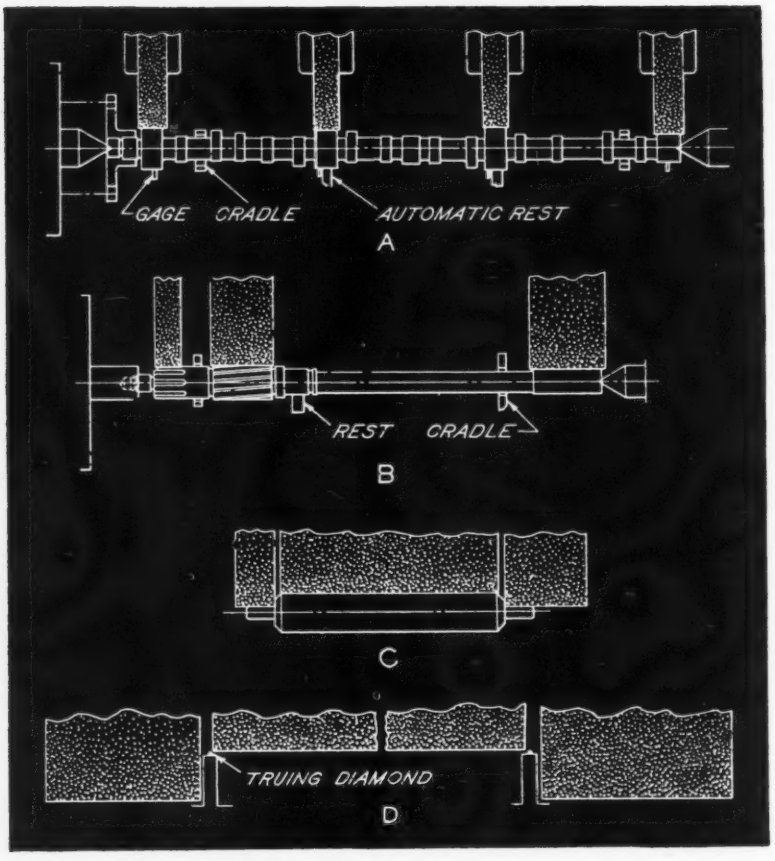
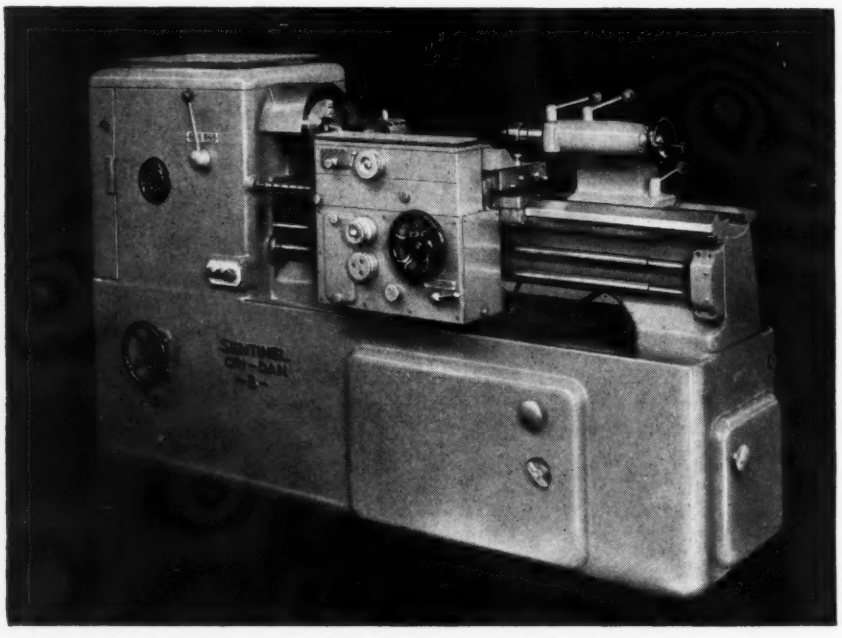


Fig. 2. Diagrams Showing Typical Multiple-wheel Grinding Jobs Handled on Machine Shown in Fig. 1

ator's position. Hydraulically operated back-rests, mounted on the swivel table, automatically move into position at the end of the rapid feed stroke. These back-rests have Carboloy-tipped shoes, and are adjustable.

The drives to the headstock spindle and wheel-spindle are through V-belts. Change pulleys are furnished for the wheel drive, so that spindle speeds may be increased when wheels are worn. The headstock has four speeds of 54 to 150 R.P.M. 61



"Sentinel Cri-Dan" High-speed Threading Machine Placed on the Market by the Lees-Bradner Co.

"Sentinel Cri-Dan" High-Speed Threading Machine

A new semi-automatic high-speed threading machine using a tool that is traversed through the cut at rates up to a hundred strokes a minute is now being distributed in the United States by the Lees-Bradner Co., Cleveland 11, Ohio. This machine, known as the "Sentinel Cri-Dan," is of radically new design. It was invented by a French engineer, M. X. Castelli, of Paris, and is built by the firm of Sentinel, Shrewsbury, England.

Threads generated by this machine with a single-point cemented-carbide tipped tool, taking a multiplicity of cuts across the work, can be readily held to tolerances of 0.001 inch on the pitch diameter. The number of strokes of the tool can be varied, and the rate of in-feed can be kept constant or can be diminished as the nature of the threading job requires. The threading tool automatically backs out of the cut at each end of the stroke, so that no relief need be provided for the tool at the end of the thread.

Provision is made for cutting multi-start threads of any number up to twelve, the indexing being completely automatic. Taper threads up to an included angle of 25 degrees and right- or left-hand threads of any standard or special form can be cut.

Standard equipment includes twenty change-gears for different pitch threads up to a maximum of 6 threads per inch, and a set of four cams for use in cutting threads having lengths of 1, 1 5/16, 2, and 2 5/8 inches. The maximum swing is 4 inches over the saddle and 13 inches over the bed. The length between centers is 3 feet. External threads up to 4 inches and internal threads up to 6 inches in diameter can be cut. The machine is driven by a 5-H.P. motor with provision for forward or reverse driving of the spindle at speeds ranging from 200 to 3600 R.P.M. The machine is approximately 7 feet 6 inches long by 2 feet 8 inches wide, and weighs about 3000 pounds.....62

To obtain additional information on equipment described on this page, see lower part of page 220.

Heald Internal Grinders Designed for Handling Small Work

The Heald Machine Co., Worcester 6, Mass., has just added two internal grinders to its line of precison finishing equipment. The chuck type grinder, shown in Fig. 1, is specifically designed for the rapid handling of large-lot jobs of small pieces requiring the precision grinding of holes up to 2 inches in diameter.

Controlled diminishing feed, which produces "spark-out" effect as size is approached; faster cycles and quicker set-ups obtained by improved controls; minimum maintenance; automatic sizing with either "Size-Matic" or "Gage-Matic" equipment; anti-friction work-head cross-slide; smooth table motion; and sealed hydraulic pump and tank are features of the new machine.

The swing over the table is 13 inches, and inside the guard 6 3/4 inches. Holes up to 3 inches long and from 1/16 to 2 inches in diameter can be ground. The maximum included angle of taper-ground holes is 60 degrees. The table has a travel of 12 inches and unlimited speeds ranging from 0 to 35 feet per minute. Two work-head speeds of 960 and 1360 R.P.M. are available. Maximum power cross-feed is 0.030 inch. The machine, with coolant tank, requires a floor space of 69 by 50 inches and weighs about 4265 pounds.

The new Heald centerless type internal grinder, shown in Fig. 2, is designed especially for small work up to 4 inches outside diameter. The principle of work-holding and rotation employed produces uniform wall thickness and a high degree of accuracy with respect to concentricity between the inside and outside diameter, as well as permitting accurate reloading for multiple operations. Being fully automatic, these machines are suited to battery installations where one operator handles several machines.

Controlled diminishing feed; faster cycles made possible by new automatic loading and unloading device and independent cross-slide feeds which can be set at highest rate consistent with desired results; provisions for quick, easy set-ups; convenient controls; automatic sizing; and

Fig. 1. Heald Chuck Type Internal Grinder

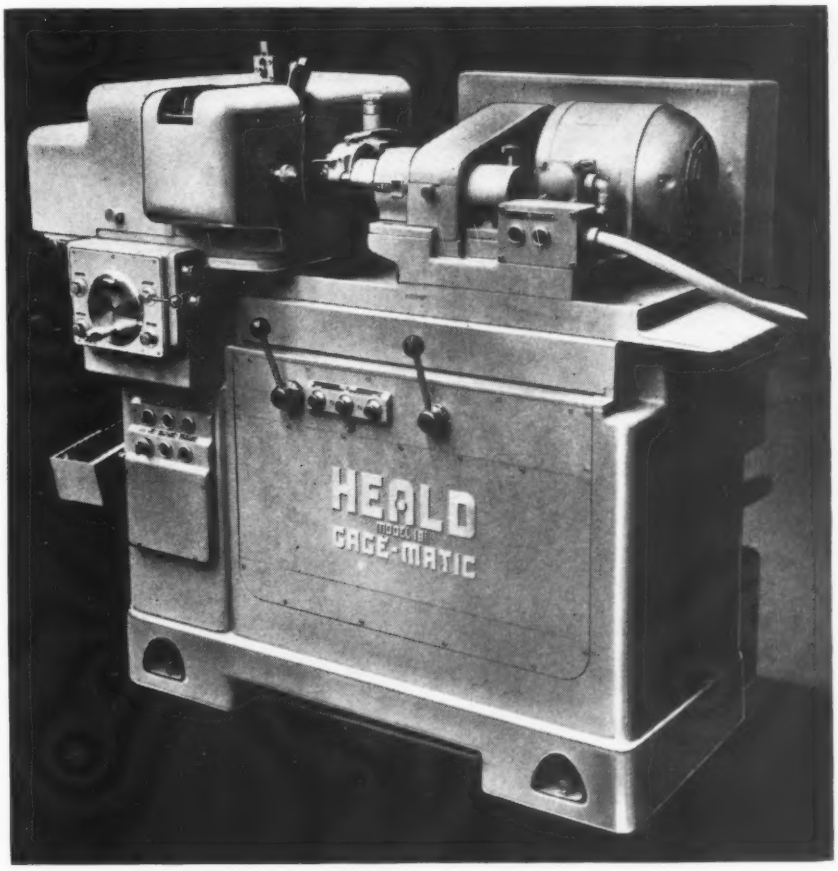


Fig. 2. New Internal Centerless Grinder Brought out by Heald Machine Co.

To obtain additional information on equipment described on this page, see lower part of page 220.

centerless roll unit that holds part to be ground between three rolls are some of the important features of this new centerless grinding machine.

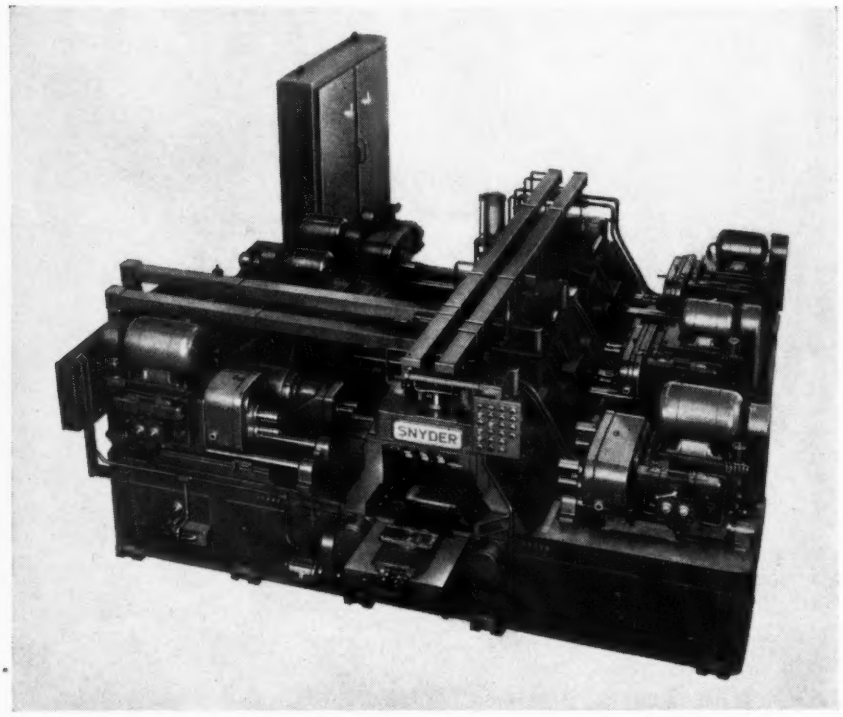
Work from 1 inch to 4 inches outside diameter can be held between the rotating rolls. With special rolls and guides, smaller work, down to 1/2 inch diameter, can be handled. The maximum length of hole that can be ground is 2 1/2 inches, and the minimum diameter of hole 1/4 inch. The maximum included angle of taper, controlled by Size-Matic, is 60 degrees. Table speeds range from 0 to 35 feet per minute. The table has a travel of 6 inches and a maximum power cross-feed of 0.030 inch. The floor space required, including coolant tank, is 69 by 50 inches, and the machine weighs about 4780 pounds.....63

Snyder Special Cylinder-Block Drilling and Boring Machine

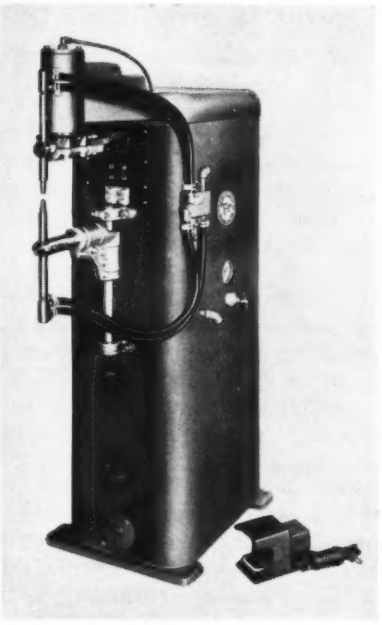
A machine designed to combine a series of core-drilling, drilling, boring, counterboring, spot-facing, chamfering, and semi-finish boring operations on heavy cylinder blocks has been built by the Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. This machine has been especially constructed to save floor space, control accuracy, and reduce the time required for handling heavy engine blocks.

The first transfer plate on the machine, acting as a turntable, receives a cylinder block from the conveyor and indexes 90 degrees to bring it into position to enter the working stations, with the ends of the block facing the tools. Starting of the automatic work cycle moves the positioned part to the first work station. The hydraulically actuated transfer mechanism transfers eight cylinder blocks simultaneously, each block being moved progressively from station to station until all operations have been completed and the work is delivered at the end of the machine.

As the blocks reach the work stations, they are hydraulically raised and clamped against the oil-pan face, after which the toolheads advance and perform their respective operations. All units are provided with interlocking switches. Chips are removed to a chute by screw type conveyors. The machine has a production rate of forty units an hour.....64



Special Cylinder-block Drilling and Boring Machine Built by the Snyder Tool & Engineering Co.



Spot-welding Machine Built by the Banner Products Co.

Banner Spot-Welding Machine

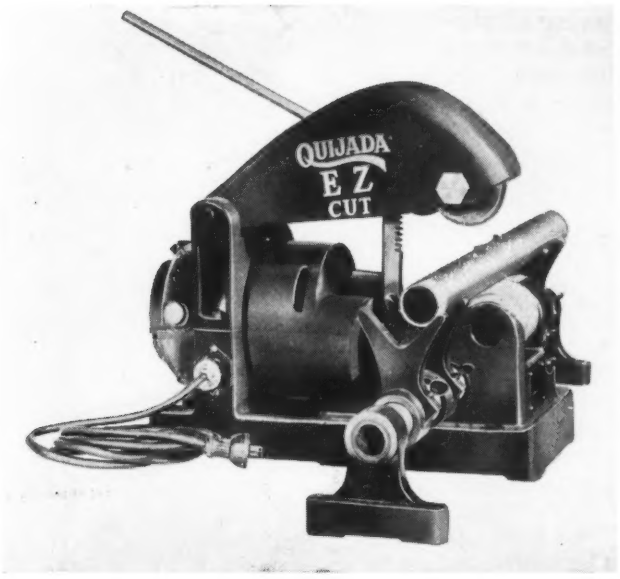
The Banner Products Co., 4934 N. 29th St., Milwaukee, Wis., has brought out a 15-K.V.A. air-operated spot-welder which has a steel guide extending through the cylinder wall and piston which prevents side play of the head and assures clean, uniform welds. This machine is designed for high-production service, and is capable of welding 18-gage mild steel. Other outstanding features include an aluminum bronze piston with long bearing surface and three cast-iron piston-rings, which reduce friction to a minimum.

The water manifold, located on the outside of the frame, is designed for parallel cooling of the transformer and electrode-holders. The machine has a throat depth of 12 or 18 inches and a stroke of 1 1/2 inches. 65

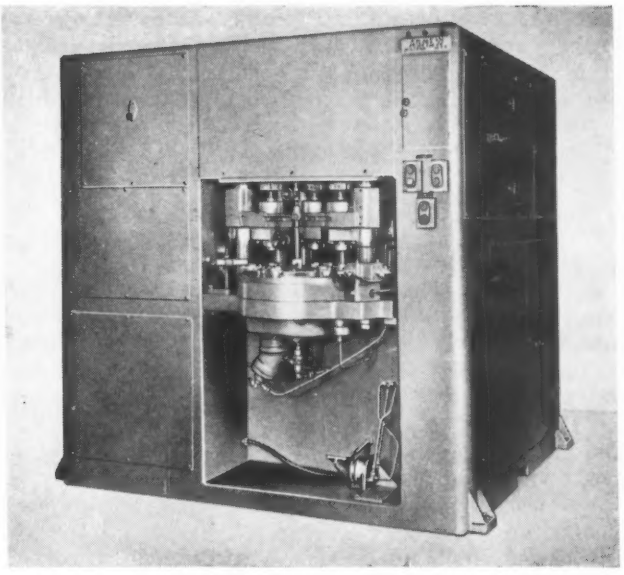
Quijada Automatic Pipe and Tube Cutter

Power-driven rollers, automatic stop-start action, and ball-bearing equipment throughout, including ball-bearing mounted cutter-shaft which can be easily removed to permit sharpening the cutter, are features of the new high-speed "E-Z Cut" pipe and tube cutter made by the Quijada Tool Co., Inc., 5474 Alhambra Ave., Los

To obtain additional information on equipment described on this page, see lower part of page 220.



Pipe and Tube Cutter with Automatic Control Manufactured by Quijada Tool Co.



Special Hydraulic Press Built by Agnew Electric Co. for Assembling Spark Plugs

Angeles 32, Calif. This compact, portable machine is designed to simplify and speed up cutting operations on pipes ranging in size from 3/8 inch to 4 inches in diameter. The cutter is driven by an integrally mounted, 1/2-H.P., 110-volt universal motor. 66

Agnew Hydraulic Assembling Press

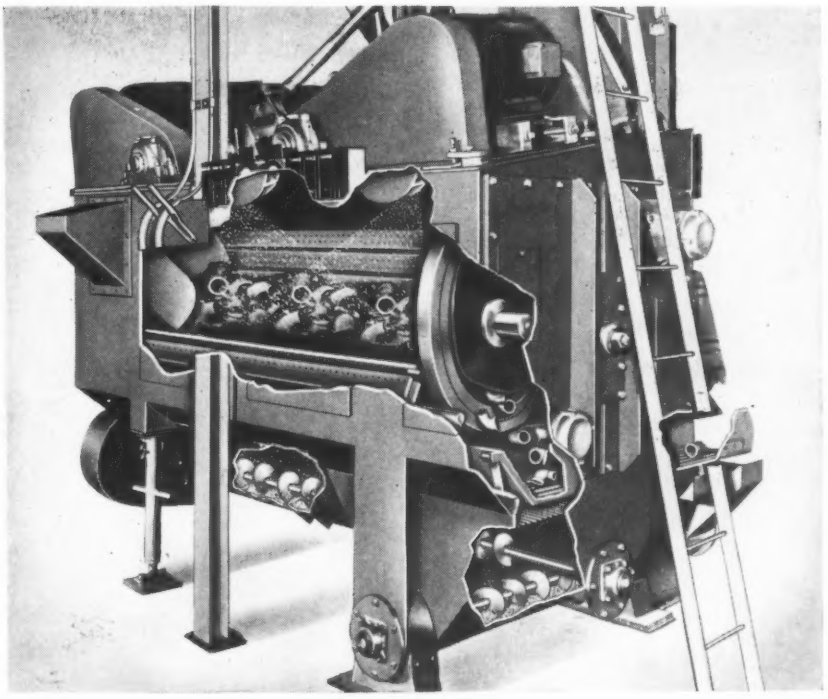
A special hydraulic machine with three press rams, which was designed for assembling spark plugs at the rate of 1500 an hour, but can also be adapted to progressive welding and forming operations, is announced by the Agnew Electric Co., Milford, Mich. The machine table has six stations which are indexed 60 degrees by a hydraulic motor. Deceleration and acceleration of the indexing speed is adjustable by means of a flow valve.

Individual pressure adjustment is provided for each of the three rams, pressures up to 8 tons being obtainable. The foot-controlled machine continues to operate as long as the control pedal is depressed.

Automatic temperature control maintains the hydraulic system, including the oil, at the proper operating temperature. The double-volume pump, driven by a 15-H.P. motor, provides fast speeds for the rams and pressures up to 1000 pounds per square inch. Water cooling is provided for the dies, punches, transformer, punch-holder, etc. The heat and pressure functions are electronically controlled. The machine weighs 10,000 pounds, requires a floor space of 60 by 60 inches, and has a height of 60 inches.....67

Continuous Wheelabrator Tumblast

The American Wheelabrator & Equipment Corporation, Mishawaka, Ind., has developed a continuous Wheelabrator Tumblast for high-production blast cleaning. It is claimed that the unique combination of tumbling and longitudinal travel imparted to the work by this machine insures thorough cleaning and eliminates



Wheelabrator Tumblast Designed for Continuous Cleaning of Metal Parts

To obtain additional information on equipment described on this page, see lower part of page 220.

time lost in starting, stopping, loading, and unloading.

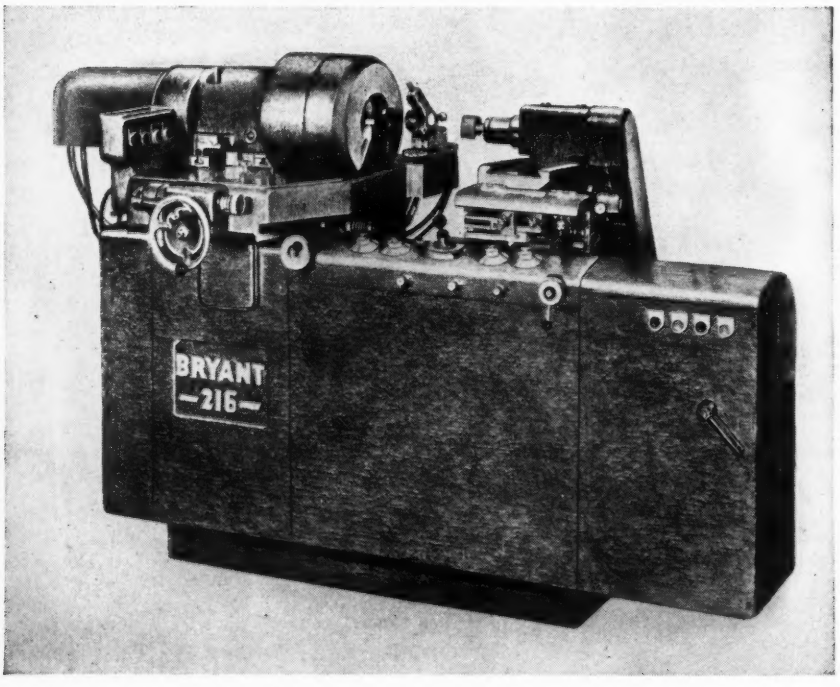
The work to be cleaned is carried through the blast barrel on an endless apron type conveyor, which constantly tumbles and cascades the pieces, exposing all surfaces to the abrasive blast from the overhead Wheelabrator unit. The speed of tumbling and the flow rate of work through the mill are adjustable. 68

Bryant Hydraulic Internal Grinder

A precision high-production automatic internal grinder designed to require the minimum of operator attention has been announced by the Bryant Chucking Grinder Co., Springfield, Vt. The machine has a 16-inch swing inside the standard water guard and a wheel-slide traverse of 15 inches. It will grind bores up to 8 inches in diameter and 6 inches in length. For the smaller bores, Bryant high-frequency wheel-spindles operating up to 100,000 R.P.M. can be used. A variety of standard or special tooling can be supplied to meet the particular requirements of the user.

The wheel-slide is supported at three points and provided with pressure lubrication at each of these points. The cross-feed is obtained by lateral motion of the work-table, which is supported by specially designed roller bearings. The various movements are hydraulically operated to afford flexibility of operation. Cycle control is accomplished electrically, and can be readily changed to suit varying working requirements.

Three methods of automatic sizing are provided, the basic machine being so equipped that change-over from one method to either of the others can be accomplished by merely adding the sizing equipment. For taper-grinding, the wheel-head is swung about a center directly under the chuck. Tapers up to 60 degrees included angle can be ground.....69



Bryant Hydraulic Internal Grinder with Choice of Three Automatic Sizing Controls

Williams Diemaking Machine

The Connecticut Tool & Engineering Co., 544 Iranistan Ave., Bridgeport 4, Conn., has developed the Williams diemaking machine shown in the accompanying illustration for machine-filing of dies, gages, cams, templets, machine parts, and various other types of work ordinarily requiring hours of tedious hand operations by highly skilled workers.

Williams Diemaking Machine Developed by the Connecticut Tool & Engineering Co.

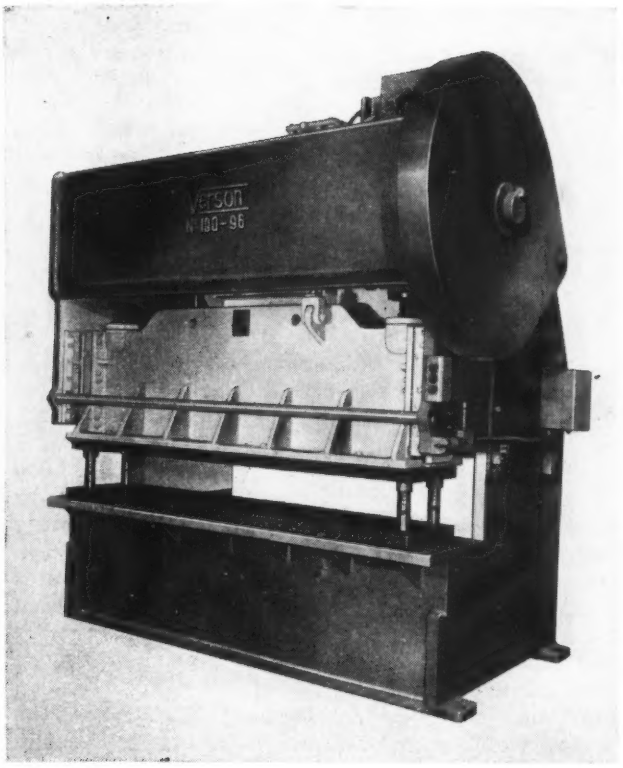
Jewelers' saws and regular hacksaws up to 3/8 inch in width and files of any thickness from 1/64 up to 1/2 inch can be used on the machine. The table can be tilted in any direction, and is accurately calibrated to a 10-minute reading on verniers. The file stroke can be set to any desired length up to 5 inches. A foot-pedal starts or stops the machine. Two finger support arms are provided for holding the work on the table. Raising or lowering of the entire table unit is easily accomplished by means of a handwheel. Power is furnished through a United States Vari-drive motor which provides shockless transmission of a wide range of speeds. A 1/2-H.P., 1800-R.P.M., 220- to 440-volt motor is used. 70

Verson Allsteel Gang Press

To bridge the gap between press brakes and large, heavy blanking presses, the Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill., has developed a line of gang presses with capacities from 100 to 350 tons, and bed lengths from 72 inches up.

These presses are especially designed for blanking, forming, punching, shallow drawing, and

To obtain additional information on equipment described on this page, see lower part of page 220.



Gang Press Developed by the Verson Allsteel Press Co.

Honing Machine Brought out by Staple Engineering Co.

multiple operations whereby a series of operations can be performed in one handling of the work. The press is hand- or foot-operated, and is controlled by push-buttons and a selector panel for obtaining inching, one-stroke, or continuous operation. 71

Wickes Double-End Drive Crankshaft-Turning Machine

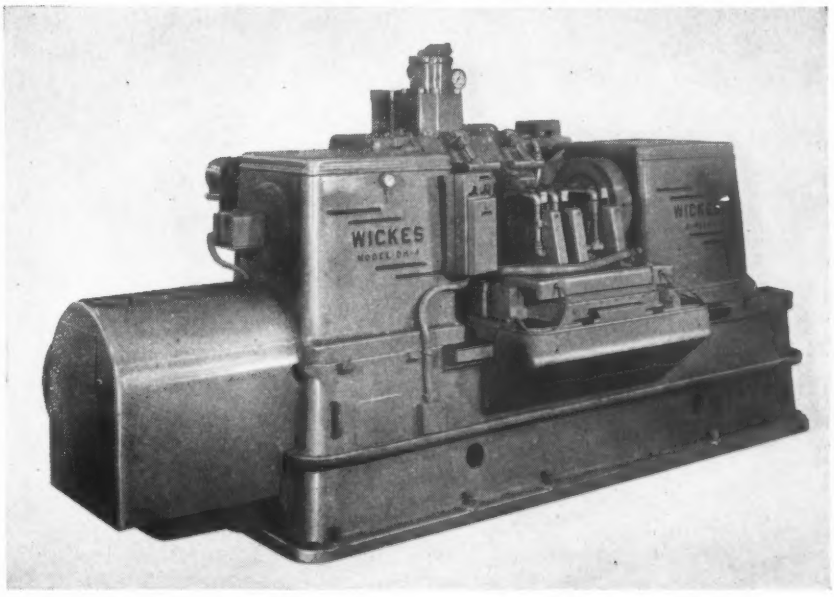
A double-end drive crankshaft-turning machine designed for high-speed operation, which uses all carbide turning tools, has been announced by Wickes Brothers, Division of the Wickes Corporation, Saginaw, Mich.

This new machine is arranged for simultaneously rough-turning and finish-turning the outside diameter of the six counterweights, as well as rough-turning and finish-turning clearance chamfers on the six crank-arms on a four-throw, five main-line bearing, forged crankshaft for a V-8 engine.

This machine is completely automatic, and is capable of producing thirty-five crankshafts per hour. It is provided with front and rear cam-operated angular cross-slides, as well as longitudinal turning slides mounted in the back tool housing. Hydraulic feed is provided for all tool-slides, power being furnished by a 40-H.P. main drive motor. The total weight of this new double-end drive crankshaft-turning machine, equipped as shown in the illustration, is about 27,000 pounds.....72

Honing Machine for Production and Tool-Room Work

A new model honing machine has just been added to the line of honing equipment built by the Staple Engineering Co., Box 312, Birmingham, Mich. This machine is designed to hone parts having



Double-end Drive Crankshaft-turning Machine Developed by Wickes Brothers

To obtain additional information on equipment described on this page, see lower part of page 220.

inside diameters ranging from 1/4 inch to 4 inches. A machined surface is provided on which work-holding fixtures can be mounted. For production work, the parts are held in a fixture and the honing stroke is actuated by hand. However, for small-lot toolroom work, the piece is generally also held by hand.

The spindle drive is by a 1/2-H.P. motor through a variable-speed drive. When using a 1200-R.P.M. motor, spindle speeds are variable from 300 to 980 R.P.M., and with a 1750-R.P.M. motor, spindle speeds from 490 to 1480 R.P.M. are available. 73

Avey Drilling Machine

The Avey Drilling Machine Co., Cincinnati 1, Ohio, has announced a new BMA-6 drilling machine having six speed changes. These changes in speed are easily and quickly made through selective and sliding gears. The machine is controlled by a single lever. Equipment includes a standard-frame constant-speed motor for each spindle. A V-belt is used for the final drive from the gear-box to the spindle to increase sensitivity and speed up the drilling operation.

The four-spindle machine shown in the accompanying illustration has a 12-inch overhang. The first spindle has the Avey-matic feed; the second spindle, a plain power feed; the third spindle, a hand feed; and the fourth spindle is designed for tapping and has a reversing motor. This machine has capacity for drilling a 7/8-inch hole in cast iron.....74

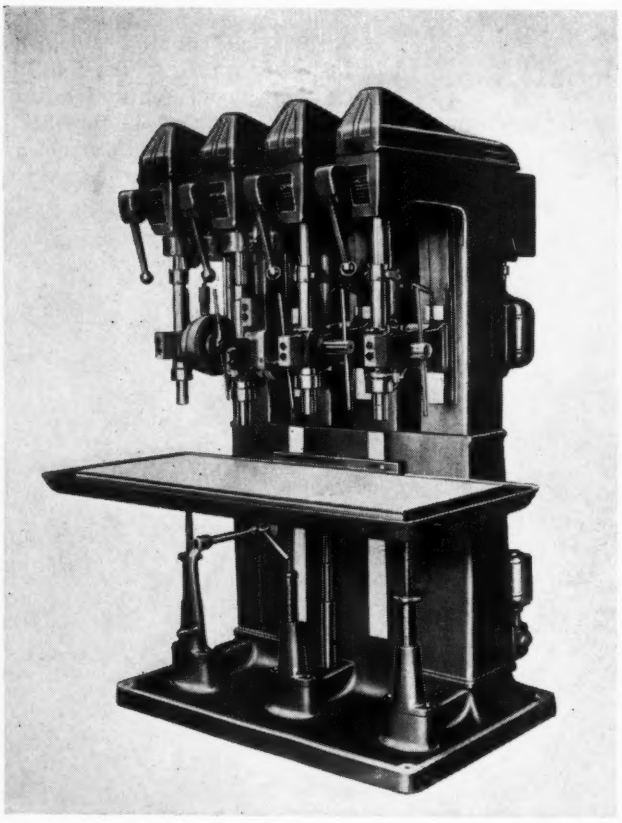
Roto-Table with Single Power Unit for Driving Hand-Cranked Tools

A Roto-Table with a central power unit consisting of an electric motor and gear-box for driving hand-cranked tools and machines mounted on the table has been developed by the Roto-Table Co., 2605 E. Third St., Dayton 3, Ohio. The single power unit provides an economical means of increasing production and saving floor space. Although originally developed for use in sheet-metal shops, this Roto-Table equipment is also being used successfully in machine shops.

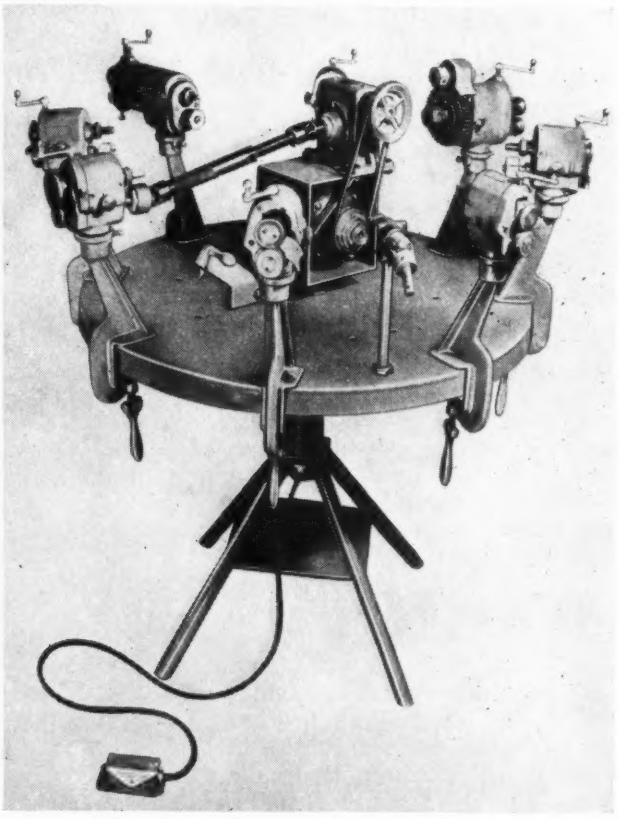
The table is 42 inches in diameter and rotates around a central shaft to which the power unit is attached. A spring-loaded arm having universal joints and sockets at each end connects the drive unit with the machines mounted around the rim of the table.....75

Bryant Bench Type Air Impact Hammer

An air-operated bench type impact hammer using an air-line pressure of 100 pounds per square inch, which will deliver blows ranging from 1 ounce to 12,000 pounds, has been announced by the Bryant Products Distributing Co., 297 W. Michigan Ave., Jackson, Mich. This press operates on a recently developed "exploded air" principle, in which air under high compression is equalized on both sides of the piston. Sudden exhausting of the air below the piston results in an exceptionally heavy blow for a press of this size. The force of the blow can be adjusted from practically zero to maximum as required, the impact pressure selected being the same at any point in the stroke.

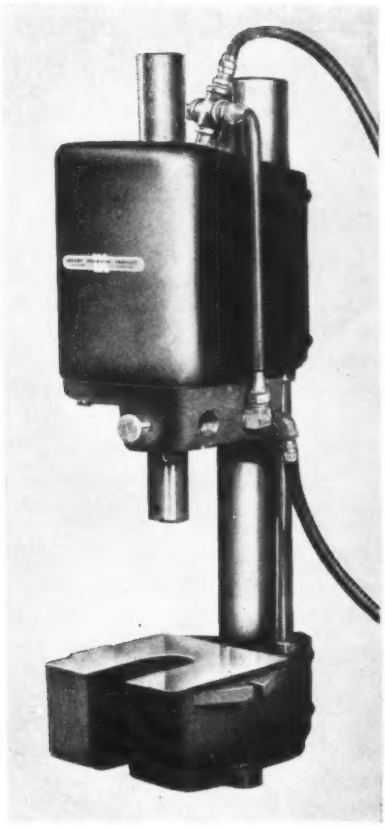


Four-spindle Drilling Machine Recently Placed on the Market by the Avey Drilling Machine Co.



Roto-Table with Central Motor Drive which can be Connected to Any of the Tools Mounted on the Table

To obtain additional information on equipment described on this page, see lower part of page 220.



Bryant Bench Type Air Impact Hammer

The press is especially adapted for light stamping and forging, molding, coining, and forming of various materials. It will handle production riveting jobs requiring mild steel rivets up to the 1/4-inch size. The operating speed by hand or foot control is sixty strokes per minute. The hammer has a stroke of 3 inches; the distance from ram to column is 3 1/4 inches, and from ram to base, 10 inches. 76

Walker Permanent-Magnet Type Magnetic Chucks

The O. S. Walker Co., Inc., Worcester, Mass., has announced a new line of permanent-magnet type magnetic chucks to be made in 4- by 8-, 5- by 10-, 6- by 12-, 6- by 18-, and 8- by 24-inch sizes. Rotary models in sizes up to 12 inches in diameter will also be made. These chucks are adapted for holding work on milling machines, planers, shapers, grinders, and lathes, as well as for bench operations. They have practically the same operating advantages as the electromagnetic types. 77

Brown & Sharpe Redesigned General-Purpose Grinding Machine

The No. 13 universal and tool grinding machine built by the Brown & Sharpe Mfg. Co., Providence 1, R. I., has been redesigned to further increase its easy operating and maintenance features. This improved, general-purpose grinding machine is particularly adapted for tool-room operations, such as grinding small and medium - sized cylindrical work, form grinding, and sharpening milling cutters, reamers, and similar tools.

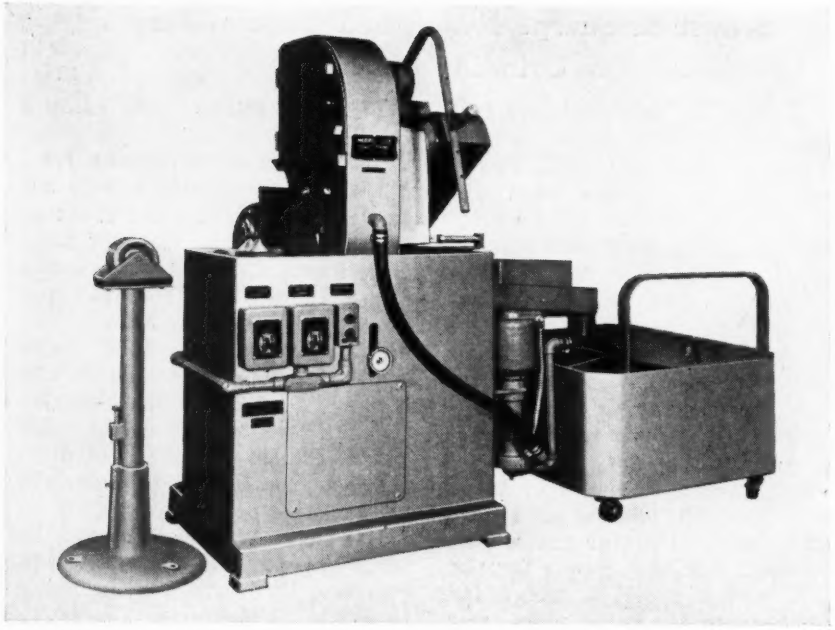
The machine is driven by three constant-speed motors, a 1-H.P. motor being used for the wheel-spindle, a 1/4-H.P. motor for the table, and a 1/6-H.P. motor for the headstock. Both plain and anti-friction bearing wheel-spindle units are available. These are of the removable type, the anti-friction bearing unit having sealed lubrication. Three wheel-spindle speeds are provided. A surface speed of 5000 feet per minute is available when using a 7-inch wheel.

Six table speeds ranging from 7 3/4 to 100 inches a minute are easily selected from the front of the machine. Two rates of hand table travel are available, namely, 6 1/4 inches and 1/4 inch per revolution of the handwheel. The headstock provides four work speeds ranging from 106 to 525 R.P.M. for both dead - center and revolving-spindle drives. The headstock spindle is mounted on preloaded anti-friction bearings of the super-precision type.

Automatic lubrication of the table ways and all mechanisms in the base is provided by a pump from the oil reservoir. The pump runs constantly while the machine is in operation, and oil from the table ways is filtered before being returned to the reservoir. A wide variety of attachments and additional equipment are available for this machine. 78

General-purpose Grinding Machine of Improved Design Brought out by the Brown & Sharpe Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 220.



Campbell Bar-cutting Machine with Wet-cutting Equipment

Campbell Hand-Operated Wet Abrasive Cutting Machine

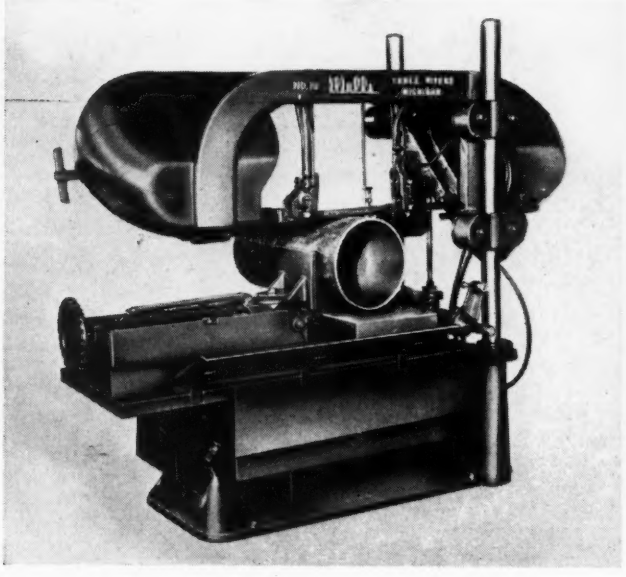
A new hand-operated wet abrasive cutting machine, designed for cutting bar stock of practically any material in solid stock sizes up to 2 inches in diameter or tubing up to 3 1/2 inches in diameter, has been brought out by Andrew C. Campbell, Division of the American Chain & Cable Co., Inc., Bridgeport 2, Conn. The new cutter has a 5-inch wheel flange, wheel guides, and automatic work-stop, coolant pump, and hydraulic work clamp. The wheel-mounted coolant tank has separate compartments for settling out sludge and keeping the coolant cool. 79

Wells Heavy-Duty Metal Saw

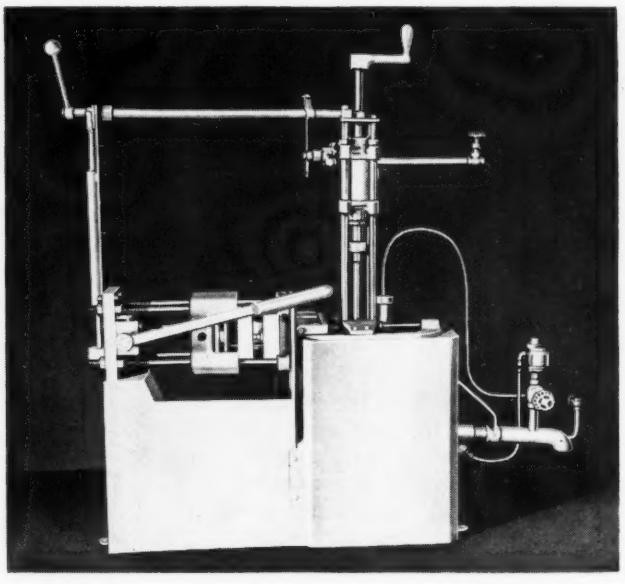
The new heavy-duty metal-cutting band saw, with automatic cutting cycle and electrically controlled blade pressure, recently announced by the Wells Mfg. Corporation, 404 S. Grant, Three Rivers, Mich., is now available with a self-contained wet-cutting system. The wet-cutting system, installed as an integral part of the saw, includes a chip pan, fluid tank, centrifugal type pump-motor unit, splash guards, and protective screens. The chip pan is mounted firmly between the bed and base. The working capacity of the system is three gallons of fluid. 80

Harvill Small-Size Die-Casting Machine

A small die-casting machine employing the "hot chamber" method of injecting the metal by means of an immersed piston operated by air pressure has been announced by the H. L. Harvill Mfg. Co., P. O. Box 177, Corona, Calif. The machine will cast zinc, lead, and tin base alloys at operating speeds up to 500 cycles per hour. The dies are opened and closed by hand. Safety interlock features protect the operator. The normal die dimensions are 6 by 10 inches. The metal injection capacity is 14 ounces of standard zinc alloy. A gas-burner unit is supplied as standard equipment, but an oil-burning unit can be provided. The machine is only 1 foot 3 inches wide, 4 feet 4 inches long and 5 feet high. 81



Wells Heavy-duty Metal-cutting Band Saw Equipped for Wet Cutting



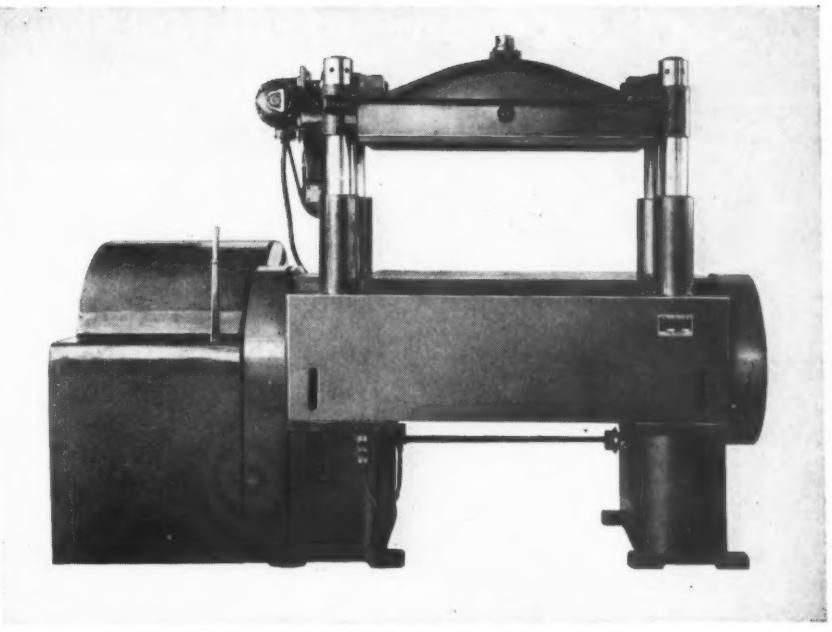
Small-size Production Type Die-Casting Machine Made by the H. L. Harvill Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 220.

Alpha Try-Out Press

Angeles 32, Calif. This compact, having a capacity of 100 tons is being manufactured by the Alpha Tool Works, 9281 Freeland Ave., Detroit, Mich. The head of this press can be lifted by electrical control and inverted, so that both members of the die are accessible for finishing work without removing the die from the press. After finishing, the head is returned electrically to its original position for another try-out of the die. The head is relocated by hardened and ground pins.

The stroke of the press is 6 inches; maximum and minimum shut heights, 16 and 12 inches; shut-height adjustment, 4 inches; clearance between columns, 44 inches; and size of bolster plate, 65 by 26 inches. The press is rated at 10 H.P. 82



Die Try-out Press Made by the Alpha Tool Works

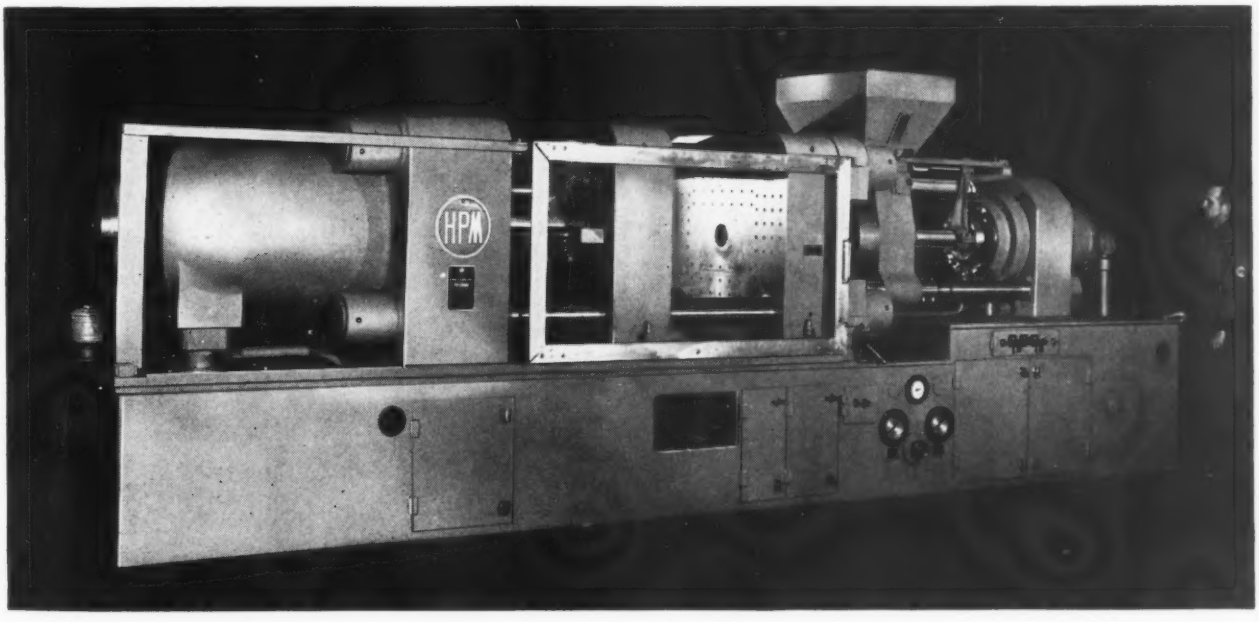
H-P-M Plastics Injection Molding Machine

A thermoplastic injection molding machine capable of molding 40 ounces of acetate or 32 ounces of polystyrene per cycle has been brought out by the Hydraulic Press Mfg. Co., 1042 Marion Road, Mount Gilead, Ohio. This giant machine, said to be one of the largest single-nozzle injection machines ever built, was designed specifically to broaden the scope of plastics mass production to include such items as refrigerator parts, large radio cabinets, and similar large-area work. The machine is entirely automatic, the operator merely removing the parts after they have been ejected from the mold.

The machine is 264 inches long by 60 inches wide and weighs 82,000 pounds. The heating chamber for plasticizing molding material is over 3 feet long. The Hydro - Power variable - displacement, radial, piston type hydraulic pumps generate the operating pressure, oil being used as the hydraulic medium. The machine is operated by a 50-H.P. motor.....83

Nylon-Reinforced V-Belt

A nylon-reinforced V-belt, said to have twice the strength and four times the average life of conventional V-belts, has been developed by United States Rubber Co., Rockefeller Center, New York, N. Y. The belt contains a series



Plastics Molding Machine Brought out by the Hydraulic Press Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 220.

IMPROVED for higher operating efficiency . . . t

IMPROVEMENTS

START

HERE

NEW WHEEL SPINDLE FEATURES

- Choice of two styles of completely self-contained spindle units—
  Plain-Bearing with automatic compensation for wear or *Antifriction-Bearing* with sealed grease lubrication
- Simple V-belt spindle drive protected by guard. 3 wheel speeds, quickly obtainable
- Upright base graduated to 110 degrees each side of zero.
- Lever facilities swiveling upright
- Single bolt clamps spindle slide upright

BROWN &

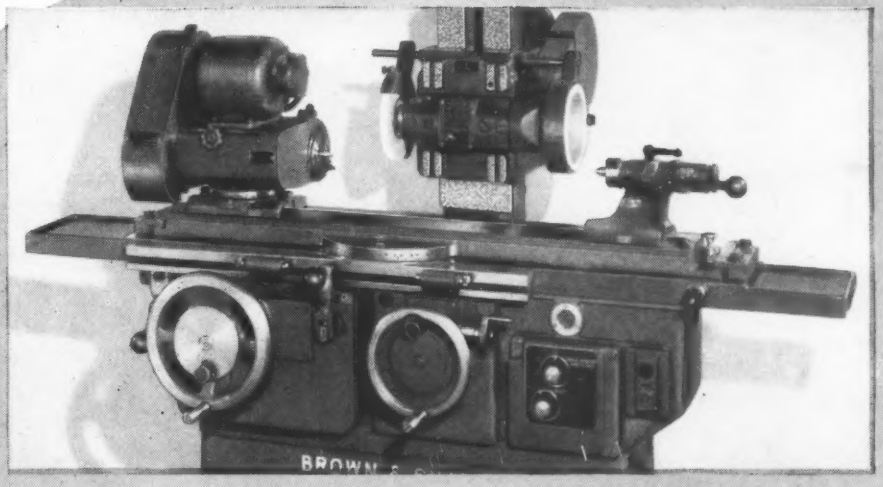
. . . the NEW DESIGN No. 13 UNIVERSAL & TOOL GRINDING MACHINE

BETTER PERFORMANCE STARTS HERE

This general-purpose No. 13 Universal & Tool Grinding Machine embodies many outstanding refinements in design and construction . . . engineered to simplify its set-ups, increase its versatility and prolong its service life. Automatic lubrication now protects all major mechanisms and bearing surfaces. In addition, it has all the broad utility and flexibility of the previous model. With this *new design* No. 13, you can increase the efficiency of such toolroom operations as the grinding of small and medium sized cylindrical work, form grinding, sharpening milling cutters, reamers and similar tools and miscellaneous other types of work. *Capacity:* centers swing 8" in diam.; take 24" in length.

Checklist OF IMPROVEMENTS

- Improved Wheel Spindle and Headstock
- 6 table speeds from 7¾" to 100" a minute
- New "bumping" control knob for table adjustment
- 4 changes of work speeds
- Automatic lubrication
- Built-in electrical controls meet MTE standards



MOTOR-DRIVEN HEADSTOCK

- 4 work speeds for dead-center or revolving-spindle grinding.
- Headstock spindle mounted on preloaded antifriction bearings.
- Angular settings to 100° each side of zero.

NEW CORRELATION OF CONTROLS

- Related grouping of all control permits maximum output . . . minimum operator fatigue.
- 6 rates of table speeds . . . changed from front of machine. Table has individual (¼ H.P.) motor drive.
- Convenient start-stop lever for headstock spindle and power table movement — or headstock only.

For complete specifications and descriptions of the new design No. 13, write Brown & Sharpe Mfg. Co., Providence 1, R.I., U. S. A.

SHARPE

B·S

of tough nylon cords covered with a special synthetic rubber compound capable of withstanding the deteriorating effects of heat and oil.

The belt, which is to be known as the "U. S. Royal Super Service V-Belt," is particularly recommended for power transmission on equipment subject to rough usage. In addition to high tensile strength, it has great flexibility and a sufficient amount of elasticity to absorb shock. 84

Bliss Welding Press for Assembling Large Metal Sections

The E. W. Bliss Co., 450 Amsterdam Ave., Detroit 2, Mich., has brought out a welding press designed for the high-speed assembling of large metal sections, such as chassis, dashboards, body panels, and similar work. Complicated assembling operations can be performed automatically in one step on this new press.

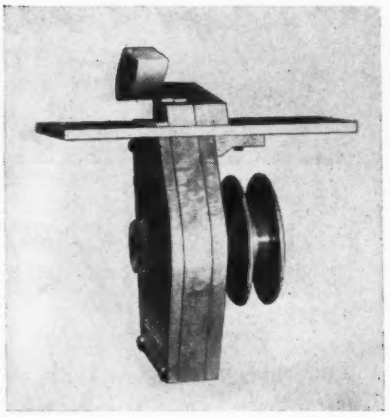
The units to be assembled are positioned on the lower die or preloaded on conveyors, after which the press cycle is completed automatically. The lower die is raised until it comes in contact with the upper die, which contains welding tips placed in positions corresponding to the spots to be welded. Limit switches stop the slide in the correct position, perform the welds, and return the slide when all welds are completed. The spot-welding is done electrically, and any number of welds can be made at once.

The new welding press is available in two models, which are essentially the same except for the position of the driving mechanism. One model, designed for use where head-room is limited, has the driving unit in the base, while the other model has the driving unit on top of the press.....85

Besco Power-Driven Shear

The Besco Mfg. Co., Department MM, 519 Main St., Cincinnati 2, Ohio, has developed a small power-driven shear designed for mounting flush with the top of a work-bench. This shear can be driven from a 1/4-H.P. motor by a V-belt or from an electric drill motor mounted underneath the bench. The unit is adaptable for slitting, trimming, and contour cutting of sheet metals and similar materials. The hardened and ground cutting blades are easily replaceable.

The unit is small and compact, measuring only 6 1/4 inches in height. It has a bed plate 5 by 6 inches. The weight of the shear is 6 1/2 pounds. 86

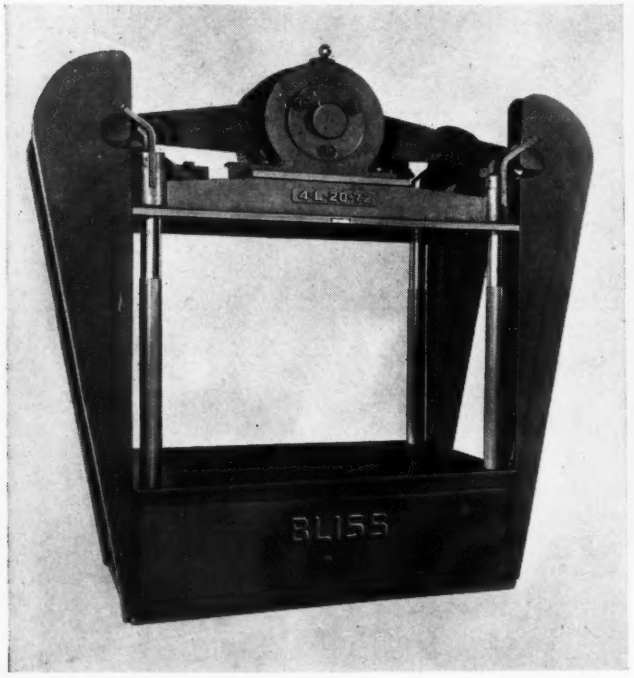


Besco Power-driven Shear

Bausch & Lomb Interferometer for Measuring Surface Flatness

The new type of interferometer for measuring the flatness of surfaces which was recently placed on exhibition by the Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y., was developed by this company's consultant, Dr. W. Ewart Williams, Pasadena, Calif.

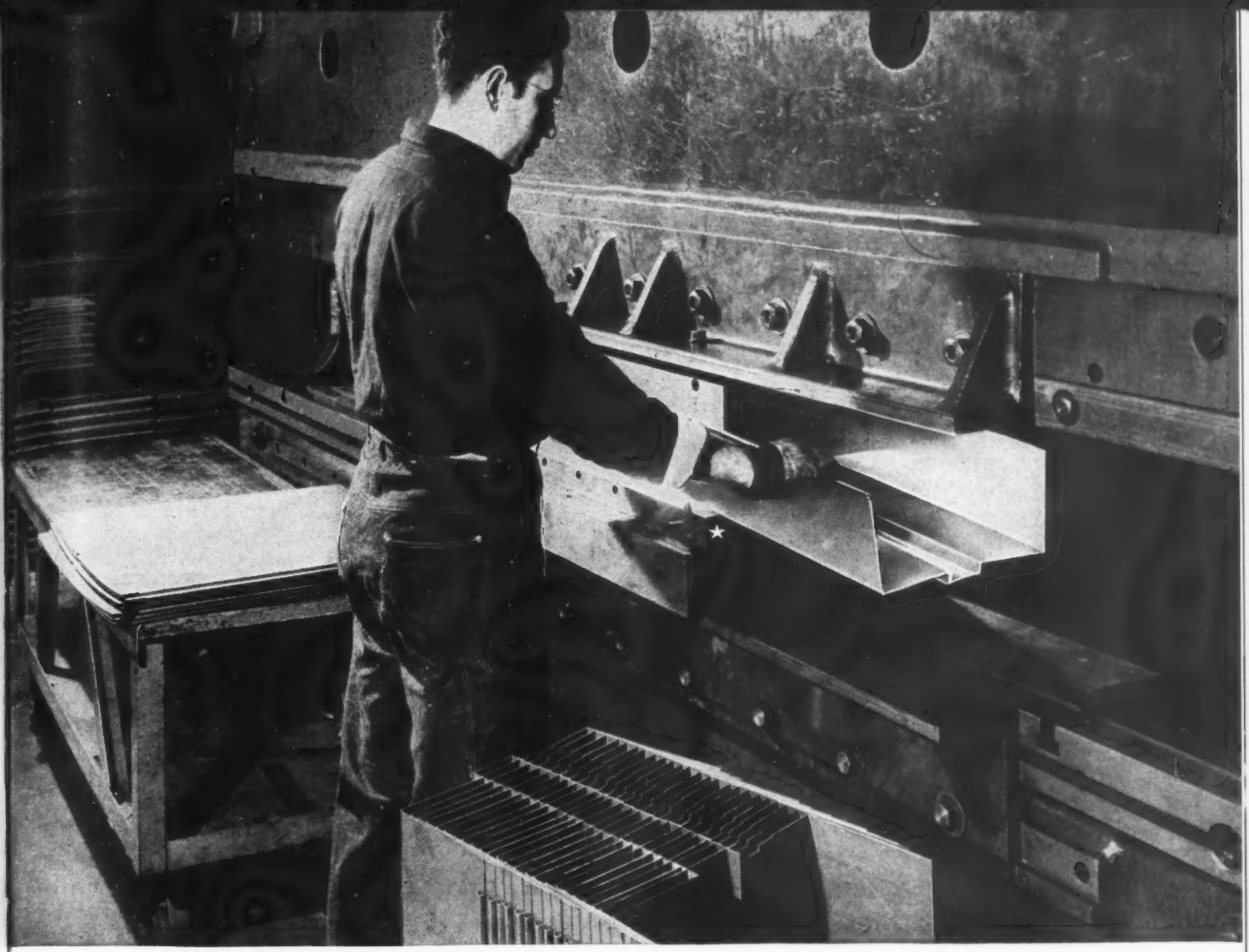
The high-precision device sets up shadow-like bands of inter-



Bliss Assembling Press for Performing Welding Operations on Large Metal Sections

Williams Plano Interferometer Brought out by the Bausch & Lomb Optical Co.

To obtain additional information on equipment described on this page, see lower part of page 220.



★ These dies are adjustable for various width drawers.

FINISHED

...IN *One* STROKE!

These wide dies, supported by removable angles, form six bends in these file cabinet drawers—finishing a drawer at each stroke of the ram.

It is production at low cost and illustrates the simple conversion of a Cincinnati Press Brake into a press. Remove the angles, and the machine is ready to function as a normal press brake.

The speed and accuracy in production, and the diversified functions of Cincinnati Press Brakes, keep them busy—make them profitable.

Write for Catalog B-2, illustrating many applications and uses of Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

ference in light reflected between a master optical flat, which has a surface accuracy of one-millionth of an inch, and the object being tested. The master optical flat is never brought into contact with the object under inspection, thus eliminating the possibility of its being scratched, worn out or distorted by contact with the object being tested. Surfaces with recesses as deep as 4 inches can be viewed with this instrument.....87

Niagara Heavy-Duty Squaring Shears

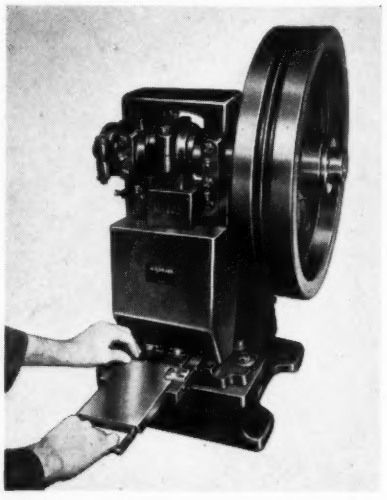
An addition to its line of heavy-duty underneath-drive squaring shears has been announced by the Niagara Machine & Tool Works, Buffalo 11, N. Y. The new machine has a capacity for cutting 5/8-inch mild steel in lengths up to 14 feet. It has a rectangular box-section bed and a triangular box-section cross-head that gives rigid support to the knives. This rigidity, together with the low slope of the upper knife, serves to reduce the tendency for the sheared pieces to twist, curl, or camber.

The hold-down, driven by eccentrics on the crankshaft, has self-contained, individually spring-loaded feet which clamp the metal during the working part of the cycle and automatically compensate for variation in metal thickness. The parallel ball-bearing self-measuring back gage can be arranged for either manual or electric operation. When motor-driven, it is equipped with a direct-reading indicator located on the cross-head. 88

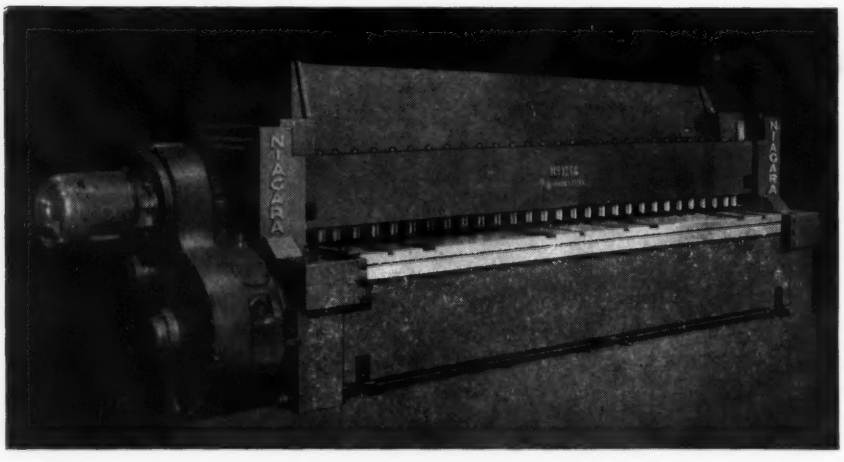
Acromark Name-Plate Stamping Machine

A 10-ton name-plate stamping press that combines consecutive serial numbering with stamping of voltages, model numbers, revolutions per minute, size, and other data in one operation is announced by the Acromark Co., 9-11 Morrell St., Elizabeth, N. J.

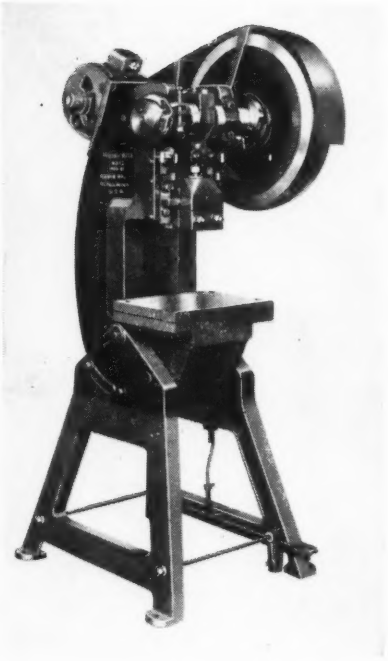
The press is a standard precision-constructed type having a bed area 12 by 7 inches and a ram stroke of 1 inch. The drive to the flywheel is through double V-belts from a 1/2-H.P. three-phase alternating-current motor. The lower shoe of the die set carries a dovetail slide with wear adjustment plate. In the press illustrated, the slide feed is operated by hand, but it can be constructed for automatic operation. 89



Name-plate Stamping Machine Brought out by Acromark Co.



Heavy-duty Squaring Shears Built by the Niagara Machine & Tool Works



Press Recently Added to Improved Line of "Press-Rite" Presses

Improved Press-Rite Presses

The Sales Service Machine Tool Co., 2363 University Ave., St. Paul, Minn., has announced that its entire line of "Press-Rite" presses have been improved and a new 12-ton press has beeen added to the line. Improvements include anti-friction roller bearings in the flywheels of all presses except the No. 0; new design positive single-stroke clutch and automatic brake; clutch engaging and disengaging mechanism of an entirely new type, designed for positive single-stroke use; clutch engaging and disengaging pawl operated by a special built-in cam which revolves with the crank; and clutch treadle that must be completely released before it can be tripped for the second stroke.

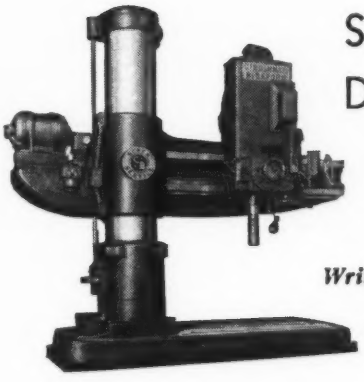
Provision has been made for using the clutch either for continuous operation with automatic feeds or as a positive single-stroke clutch. In addition to the new clutch, all presses in this line are now equipped with a special cam-actuated automatic brake; other improvements include larger die clearances, considerable reinforcement in the frame to avoid any possible deflection at any vital point of the press; triple lubrication for ram ways; and larger bearings. 90

To obtain additional information on equipment described on this page, see lower part of page 220.

It's all done here

1. Instant change of 36 spindle speeds by three close-set handy levers—on the head.
2. Eighteen feed changes are instantaneously made by two adjacent levers—on the head.
3. Power, column clamping and unclamping is controlled by two convenient push buttons—on the head.
4. Arm elevating and automatic clamping is controlled by a single lever—on the head.
5. Power rapid traverse of head in either direction by single lever—on the head.
6. Start, stop and reverse spindle by one lever—on the head.

At the finger-tip every control is always handy for the operator. His time is conserved and productivity increased. Correct, safe manipulation is easy on Cincinnati Super Service Radial Drills.



Write for Bulletin R-29

THE CINCINNATI BICKFORD TOOL CO.

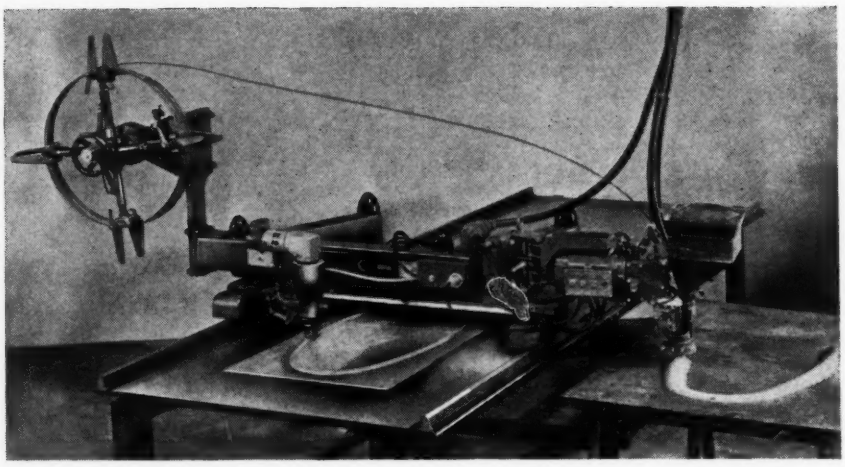
RADIAL AND UPRIGHT DRILLING MACHINES

SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 96" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.



Shape-welding Machine Brought out by The Linde Air Products Co.

Unionmelt Shape-Welding Machine

A new machine for making welds to any outline by the "submerged-melt" welding process has been announced by The Linde Air Products Co., unit of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. This machine has a carriage of the type that has proved most useful in oxy-acetylene shape cutting. The carriage guides a "Unionmelt" welding head along any desired outline through the use of a strip templet.

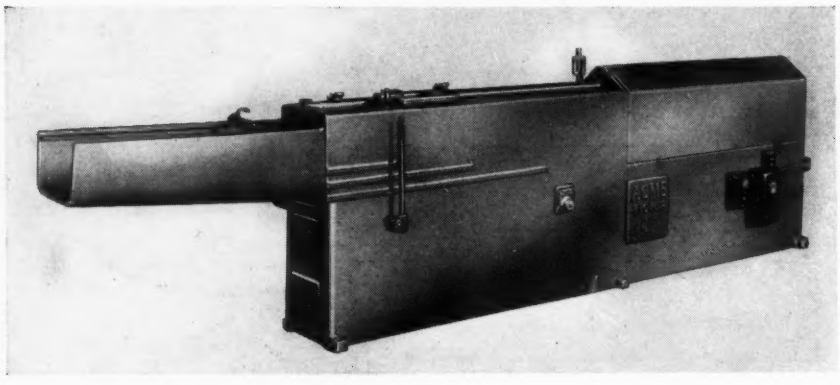
The Type U welding head illustrated has a maximum current capacity of 2000 amperes and can weld, in a single pass, material ranging from 18 gage to 1 1/4 inches thick. Heavier parts of greater thickness can be welded by a suitable number of passes.

The machine will operate over an area 34 inches wide by 80 inches long. Sections can be added to the tracing table so that any length can be covered. The welding speed is adjusted by a stepless speed control on the tracing machine. Standard or high-speed tracing heads make it possible to weld at speeds ranging from 4 to 40 or from 11 to 100 inches per minute. 91

Acme Hydraulic Broaching Machines

A new horizontal hydraulic broaching machine built in capacities of 6, 10, 15, and 20 tons, having a 54-inch stroke and capable of handling broaches up to 60 inches in length, has been announced by the Acme Broach Corporation, Lexington 47, Ky.

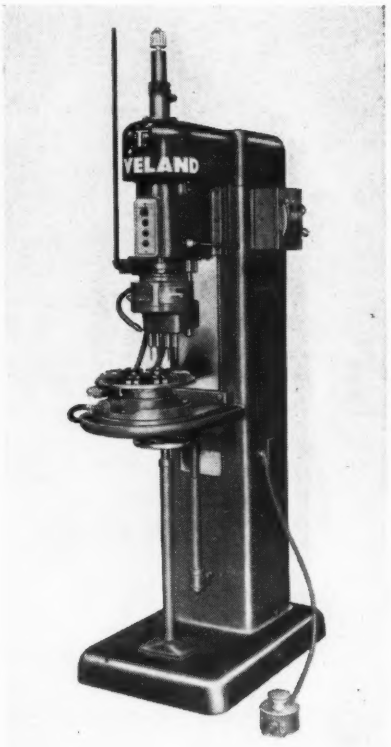
New features include an easily adjusted sliding head; tubular steel cylinders; pulling cylinder arranged to assure straight pull and minimum danger of broach breakage; hardened and ground ways; easily accessible motor and hydraulic pump; simplified hydraulic circuit with safety relief valve; built-in valve for adjusting cutting speed; high-speed individual return cylinder; and direct motor-driven coolant pump. 92



Acme Horizontal Hydraulic Broaching Machine

Cleveland Small-Hole Production Tapping Machine

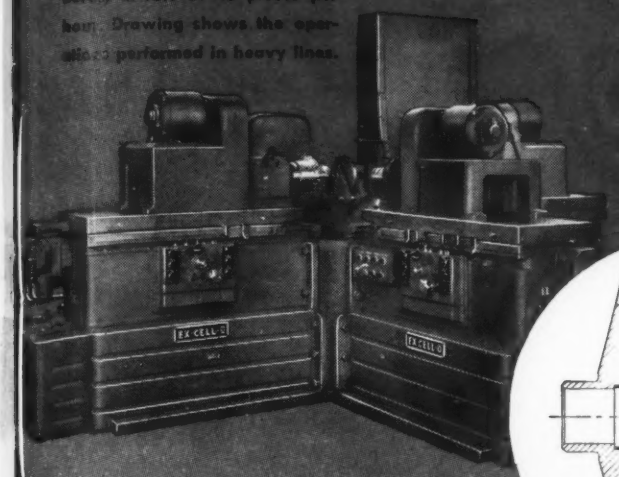
A production tapping machine with a hardened tool-steel lead-screw which is precision-ground to an accuracy of 0.0002 inch and is equipped with a wear-resisting split bronze lead-screw nut to insure accurate threads, even when tapping work requiring Class 3 and 4 fits, has been added to the line of the Cleveland Tapping Machine Co., Hartville, Ohio. This machine is driven by a 3/4-H.P., 1200 R.P.M. reversing motor, and will tap single holes up to the 1/2-inch "National Coarse Thread" size in mild steel or, using multiple heads, as many as eight No. 6-32 or four 1/4-inch holes. The reversal capacity permits operation at rates up to 1650 strokes per hour.



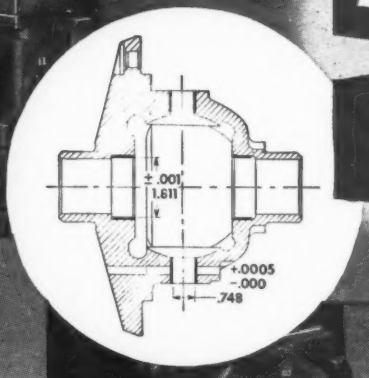
Cleveland Tapping Machine with Automatic Air Indexing Table and Four-spindle Head

To obtain additional information on equipment described on this page, see lower part of page 220.

EX-CELL-O CAN GIVE YOU MORE *Economical* PRODUCTION



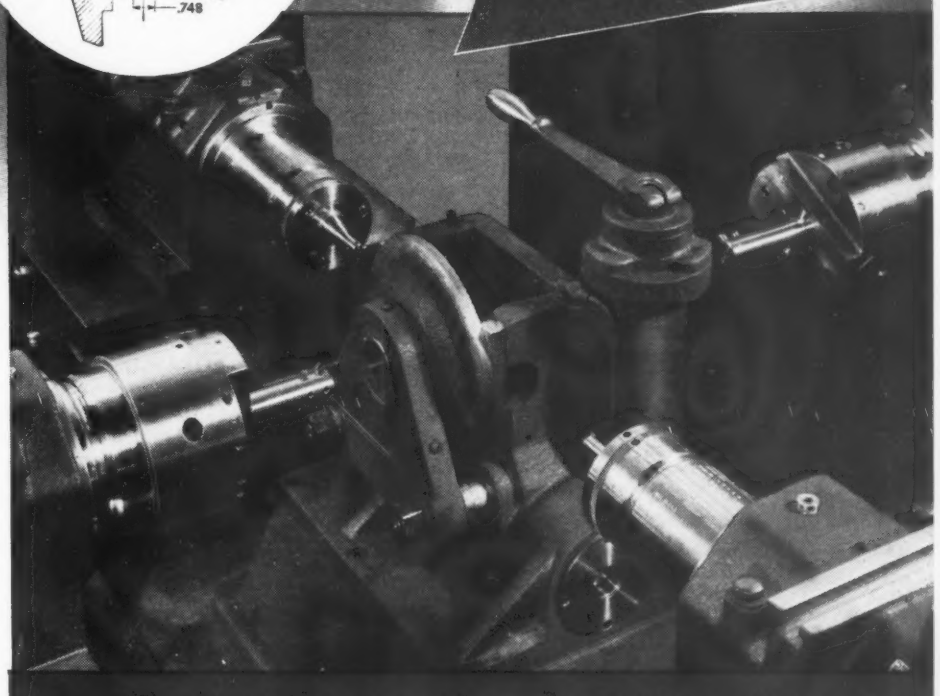
Full view of Four-Way Precision Boring Machine. Two spindles back bore and chamfer two counterbores while the other two spindles finish bore two holes perpendicular to the counterbores, at rate of 40 pieces per hour. Drawing shows the operations performed in heavy lines.



Consider Ex-Cell-O Way-Type Precision Boring Machines ...Built with Standard Units

● **Ex-Cell-O Way-Type Precision Boring Machines offer several advantages. The first cost is low because they are built with standard units. There is less handling of parts because work is loaded only once for several operations, and in addition operations can be held in exact relation to one another because parts are located and clamped only once. Holes can be bored from 2, 3, or 4 directions simultaneously to speed production. The individual way units can be rearranged to suit production requirements—part changes do not obsolete the machine.**

Ex-Cell-O Precision Boring Machines, both standard and way-type, perform boring, turning, facing, chamfering, and combinations of these operations on countless parts in varied industries. Let Ex-Cell-O engineers show you how to obtain the production you require and maintain the accuracy you specify . . . in the most economical way.



Close-up view of part in fixture and boring spindles. Boring bars on left front and right rear spindles are carried on tool slides that are retracted for tools to enter holes, are moved out to finish inside counterbores, and again retracted for withdrawal.

XLO
EX-CELL-O *for* PRECISION

EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles • Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

The new machine can be operated either manually or automatically. When the work lends itself to such handling, indexing feeds, cross-slides, and hopper feed can be combined with automatic cycling to obtain fully automatic operation. Tapping depth can be easily controlled to within 0.005 inch. A motor-driven pump supplies the tap with coolant from a tank in the base. 93

Mid-States "Hi-Cycle" Arc-Welders

Two new "Hi-Cycle" alternating-current arc-welders designed for heavy-duty industrial use have been announced by the Mid-States Equipment Corporation, 2429 S. Michigan Ave., Chicago 16, Ill. These new models, with 200 and 300 amperes output, respectively, have a unique precision electrical circuit which holds the welding arc constant, with selective heat settings in one-ampere steps through a special air-cooled induction type transformer.

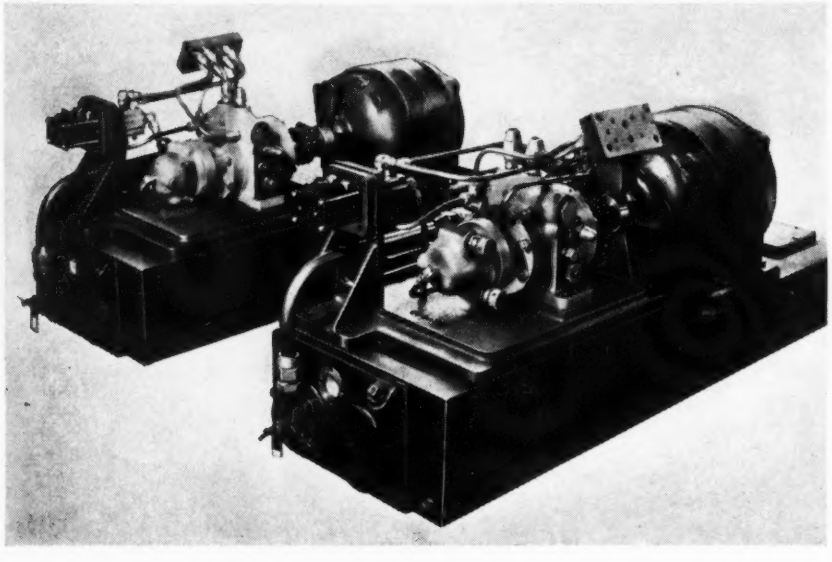
The high-frequency circuit with remote feather-touch control at the electrode-holder, used in connection with the new units, has been developed to meet electronic fluxing and oxide dispersal requirements of the new arc processes, such as inert gas shielded-arc welding and similar processes. The remote control arrangement of the high-frequency circuit is said to virtually eliminate all radio interference. 94

"Hi-Cycle" Arc-welder Announced by the Mid-States Equipment Corporation

Simplex Precision Boring Machine with Self-Contained Hydraulic Units

A two-way precision boring machine having several new features, including table platen construction designed to provide a large increase in work-handling capacity, sealed-lubrication precision boring heads, one-piece bed design, and self-contained hydraulic systems, is being manufactured by the Simplex Machine Tools Division of the Stokerunit Corporation, 4526 W. Mitchell St., Milwaukee 14, Wis. The unit type construction permits adapting the work-table of the machine to a wide range of precision boring applications.

Moving tables designed to carry the precision boring heads permit a wide variation in the weight of work-pieces and fixtures without affecting the precision of the machines. The new hydraulic systems are assembled as completely self-contained, easily serviced units, with all piping carried to one centralized manifold plate, as shown in the illustration. 95

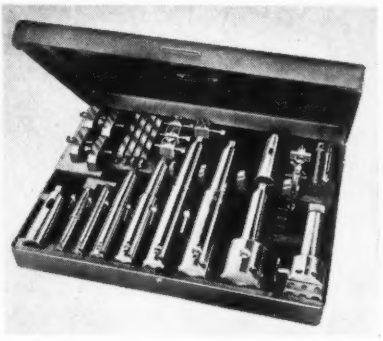


Self-contained Hydraulic Systems of Simplex Two-way Boring Machine

Davis Combination Tool Set for Boring and Fly Cutting Operations

A new combination tool set is being produced by the Davis Boring Tool Division of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., to eliminate the necessity for making repeated trips to the tool-room for different boring tools and accessories. In a typical Davis combination tool set, there are seven different sizes of super micrometer boring tools that have an infinite cutting range of 1 1/4 to 7 inches in diameter. For boring both larger and smaller holes there is a micrometer graduated boring and facing head having a working range from 0 to 13 inches. This head is equipped with different type cutters which can be mounted in the tool-slide either parallel with or at right angles to the tool shank. Thus holes in a wide variety of work can be easily bored or faced to precision limits by employing a boring tool of the correct size selected from the set.

The set-up accessories in the set are designed to speed up mount-

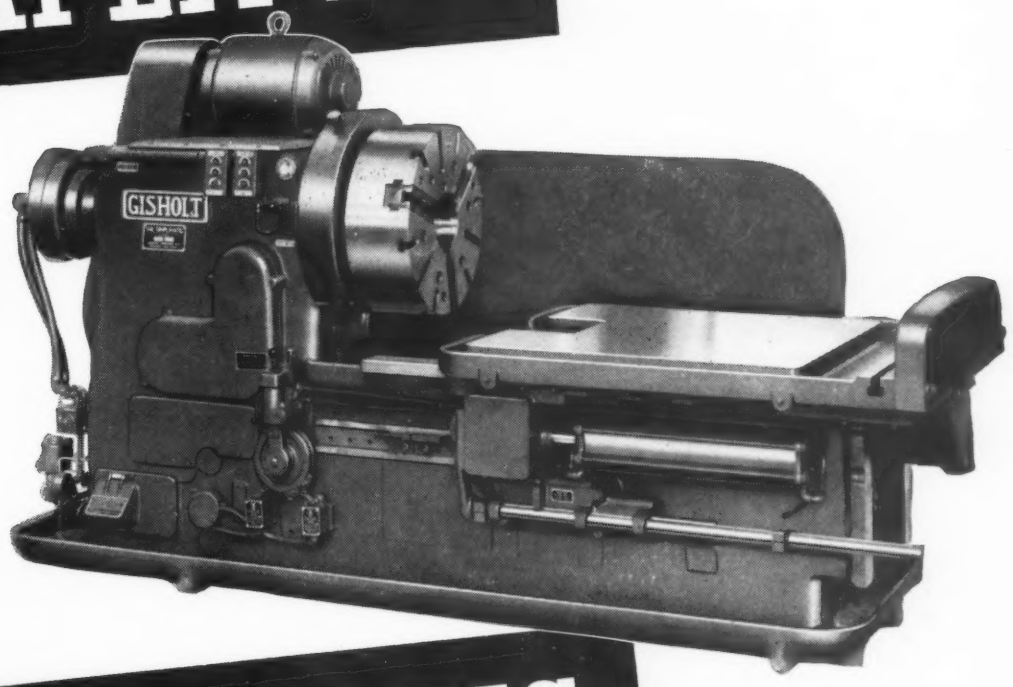


Davis Combination Boring and Fly Cutting Tool Set

To obtain additional information on equipment described on this page, see lower part of page 220.

SIMPLIFY

your "special" jobs with the GISHOLT



SIMPLIMATIC

Where you have sufficient volume for automatic machining, you, too, may find the low-cost answer in the Simplimatic.

For here's such adaptability in simple, basic design that it gives you an individualized machine to handle many diverse and unusual problems. Here are some of the reasons:

1. *A wide variety of slide positions is possible on the large platen table for straight and angular feeds.*
2. *Tailstock, hand or pneumatically operated, can be mounted on platen table for between-centers work.*
3. *Linkage arrangement between slides permits spherical boring in conjunction with facing and turning.*
4. *Back facing or back boring through the spindle can often be combined with other cuts in a single operation.*
5. *Vertical head can be used where it provides more favorable working position, with slides cammed individually or entire head cammed as a unit.*
6. *Simultaneous double end machining is possible with full utilization of the base machine.*

Now, with higher costs for labor and materials, investigate the economies the Simplimatic can bring you. Get the facts.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts.*

GISHOLT MACHINE COMPANY

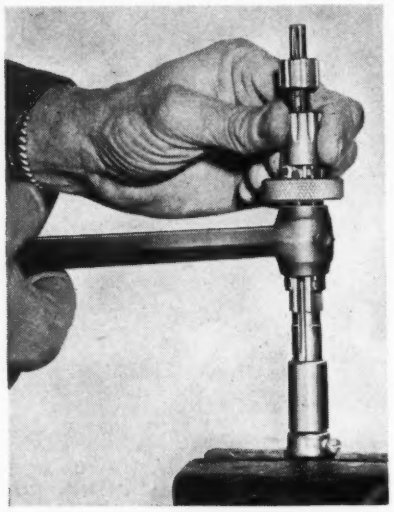
Madison 10 · Wisconsin

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SUPERFINISHERS • SPECIAL MACHINES

ing work. Four precision hardened and ground parallel blocks, four adjustable stop jacks, and four hardened and ground stop and jack blocks are included in the set. The tools and accessories are contained in a steel case. Suitable adapters are provided for the smaller size stub tools. Set assemblies can be varied to meet individual needs. Tools may be added to the set or tools not often used may be omitted. 96

Single-Blade Expansion Reamer

A single-blade expansion reamer designed to ream holes in soft metal bearings to fit pins and

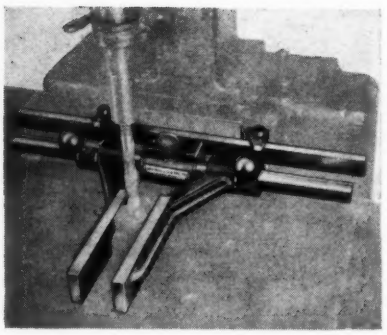


U. S. Expansion Reamer with Size-control Ring Gage

shafts, including piston-pins, has been added to the line of the U. S. Reamer & Tool Corporation, 124 S. Isabel, Glendale 5, Calif. Each reamer is supplied with standard and over-size ring gages. After selecting the desired size of ring gage, it is slipped over the reamer. The reamer is used in the usual way, but when the bearing has been reamed to the proper size, the ring gage prevents further expansion and thus insures an accurate fit. 97

Safety Work-Holder for Box-Column Drill Presses

The Universal Vise & Tool Co., Parma, Mich., has announced a universal safety work-holder designed



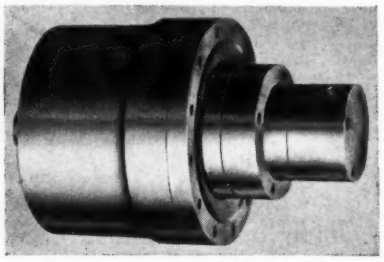
Universal Safety Work-holder for Box-column Drill Press

to be locked to the column dovetail of box-column single-spindle drill presses. This device is similar to the one described and illustrated in February MACHINERY, page 197, which is applicable to round-column drilling machines.

The new work-holder affords a quick easy method of securing drill-press work on tables where there is no provision for clamping with bolts, and can be kept on the machine. It is raised and lowered with the drill-press table, and can be locked with a quarter turn of the clamping handles. The jaws open the full width of the bar to accommodate 11-inch work. 98

Cushman High-Speed Air Cylinders for Operating Power Chucks

The Cushman Chuck Co., Hartford 2, Conn., has added an entirely new series of high-speed air cylinders to its line of air-operated power chucking equipment. These high-speed cylinders have been developed especially for machine tool applications, and are designed to assure trouble-free service under exacting operating conditions. The cylinder bodies are aluminum-alloy forgings of high tensile strength, and are finished with lapped bores to assure an efficient air seal. After assembly, the cylinders are statically balanced to eliminate vibration at high operating speeds.

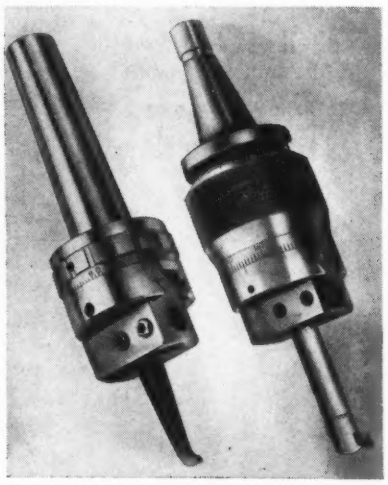


Cushman High-speed Air Cylinders for Operating Power Chucks

The cylinders will be available in 4 1/2- and 8-inch sizes. They are designed to function at speeds up to 3500 R.P.M. 99

"E-Z-Set" Boring and Facing Tools

The Maxwell Co., 420 Broadway, Bedford, Ohio, exhibited two new series of boring and power facing tools at the recent Toolmaker's Show in Cleveland. Both of these tools are made in smooth circular-shaped designs to provide



Maxwell "E-Z-Set" Boring and Facing Tools

maximum safety of operation and easy handling.

The series No. 30 "E-Z-Set" boring head, showr at the left in the illustration, is of compact design, has relatively high strength, and can be easily adjusted. The unusual capacity of this tool is made possible by the three-position location head of the boring-bar. Rapid adjustment is facilitated by the micrometer type dials. The tool is available in Models 30, 31, and 32, which have maximum boring-bar capacities of 1/2, 1, and 1 1/2 inches, respectively. The tools cover a boring range of 3/8 inch to 20 inches. Boring-bars are furnished as standard equipment.

The series No. 40 power facing tool, shown at the right in the illustration, is available in Models 40, 41, and 42, which have the

To obtain additional information on equipment described on this page, see lower part of page 220.

Why "M-11" produces

MORE TAPPED HOLES PER TAP

M-11 is a chrome-cobalt high speed steel used exclusively by Detroit Tap and Tool Company for taps, thread gages and thread milling cutters. Some of the reasons for its use are:

COBALT . . . **Takes the human element out of hardening. THIS MEANS THAT UNIFORM HEAT-TREAT CAN BE OBTAINED AUTOMATICALLY!**

Increases the red hardness over ordinary HSS. THIS MEANS M-11 TAPS ARE HARDER, TOUGHER AT OPERATING TEMPERATURES.

CHROMIUM . **Increases toughness and strength of steel after heat treatment. THIS MEANS LESS BREAKAGE.**

Causes hardness to penetrate deeper and more uniformly. THIS MEANS SAME QUALITY AFTER AS BEFORE SHARPENING.

Resists corrosion. PROTECTS TOOLS IN TOOL ROOM. ALLOWS GREATER LATITUDE IN COOLANTS.

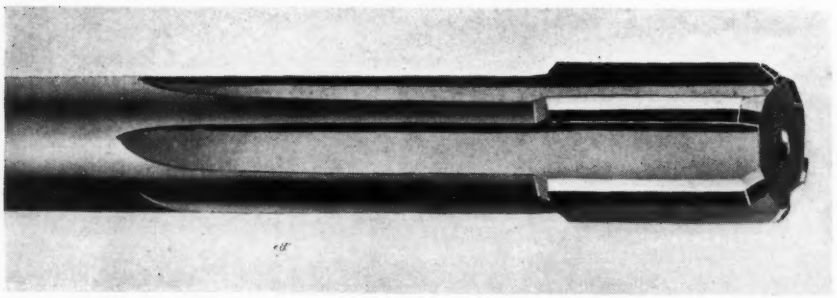
Provides greater resistance to abrasion. THIS MEANS MORE PIECES PER SHARPENING, MORE THREADS PER TAP.

This combination of chromium and cobalt in Detroit Tap's M-11 high-speed steel is available to you at no increase in cost over quality taps made of ordinary high-speed steels. And back of every M-11 tap, thread gage and thread milling cutter is Detroit's SERVICE — a service which can make the proud claim:

WE'VE NEVER "SHUT DOWN" A LINE YET!!

The Home of
"M-11"
CHROME-COBALT HSS TAPS, THREAD MILLING CUTTERS & THREAD GAGES

DETROIT
TAP & TOOL CO.
8432 BUTLER STREET • DETROIT 11, U. S. A.



Carbide-tipped Reamers Made by Super Tool Co.

same boring capacities as the No. 30 series tools, in addition to the power facing feature. These tools have interchangeable shanks and can be employed in any boring machine, automatic, drill press, or similar machine. 100

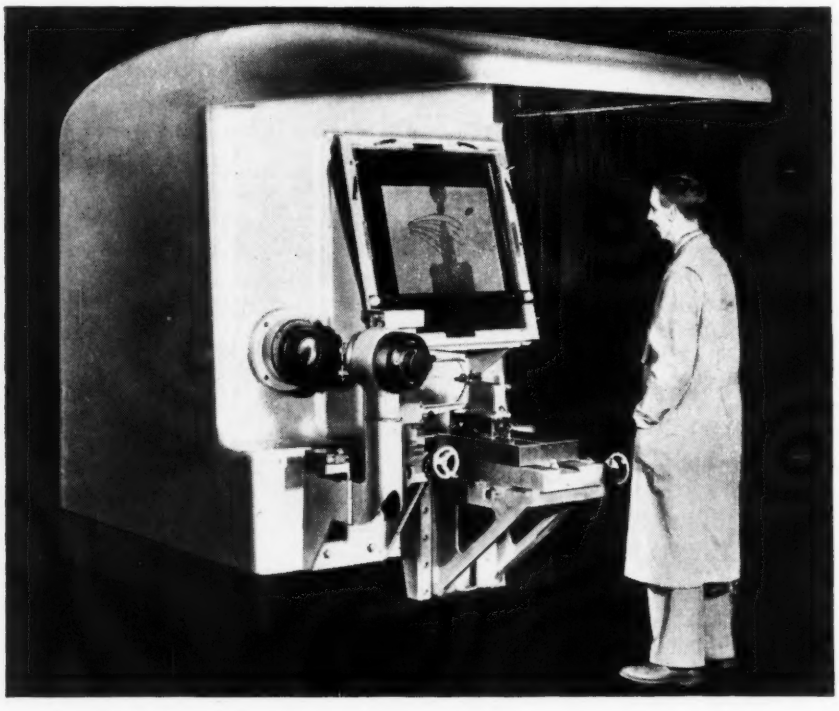
"Ream-Rite" Carbide Reamers

A new line of carbide-tipped reamers known as the "Ream-Rite" has been brought out by the Super Tool Co., 21650 Hoover Road, Detroit 13, Mich., to meet the need for lower priced carbide reamers. While not including all the features of the standard carbide-tipped reamers made by this company, these tools have the same finish and long wearing qualities as the standard line.

The new reamers are not designed for line-reaming set-ups, but are especially adapted for automatic and hand screw machine work that does not require long-flute reamers of the type made to operate through bushings. They are available in sizes from 1/4 to 5/8 inch. 101

New Checking Comparator for Turbine Blades

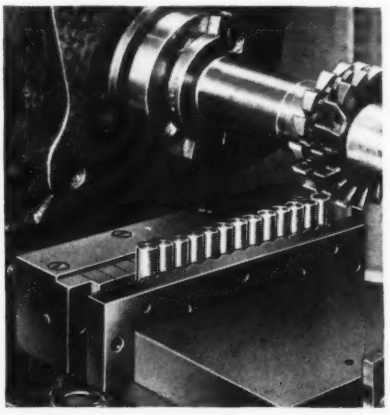
The Jones & Lamson Machine Co., Springfield, Vt., has recently designed a special turbine-blade checking optical comparator equipped with a 434-millimeter projection lens. The new lens system will take in a 6-inch diameter inspection area and project it at 5 magnifications on a 30-inch square screen. The lens aperture is 6 5/8 inches in diameter, and has a back focal length, or working clearance, of 12 1/2 inches. A special condensing lens is part of this equipment.....102



Turbine-blade Checking Comparator with 434-millimeter Lens Designed by the Jones & Lamson Machine Co.

Dery Equalizing Multiple-Jaw Gang Vise

An equalizing gang vise designed to hold any number of pieces from one up to the full capacity of the vise is being manufactured by the Dery Tool & Die Co., Pine Meadow, Conn. This gang vise consists of a solid jaw and a body which holds a series of equalizing pads or blades. The solid jaw is locked to the body with screws. The V-grooves and the equalizing pads form a three-point chuck for each piece of work. The pads and grooves of the solid jaw are the same width as the diameter of the work.



Dery Equalizing Gang Vise Used for Milling Operations

Pieces that vary in diameter can be milled simultaneously because of the equalizing feature. Tests have shown that the vise leaves no marks or scoring on soft metal pieces. For pieces that are shorter than the height of the vise, a spacer can be employed. This spacer also facilitates unloading, since it can be employed as a lever for removing the finished work after the vise jaws have been slightly opened.

The equalizing vises are made in five lengths, from 4 to 8 inches. They are 1 7/8 inches high. The equalizing blades are made in widths of 1/4, 5/16, 3/8, 7/16, and 1/2 inch, and are 1 3/4 inches high. The vises can be supplied with 90-degree vee, round, or square grooves. 103

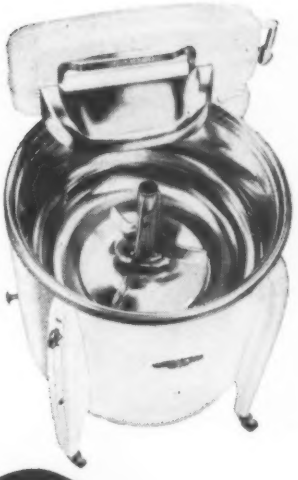
To obtain additional information on equipment described on this page, see lower part of page 220.

They're all using SHEAR SPEEDS*

*Trade Mark

for
WRINGER DRIVES

"Made better gear design possible. Reduced cutting time to 30 secs." (Washing Machine Manufacturer)

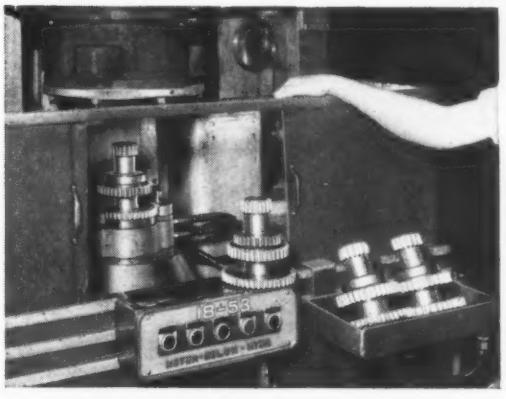


for
OVER-RUNNING CLUTCHES

"Eccentric shape cam faces easily produced. Cutting time 14 secs." (Bicycle Manufacturer)

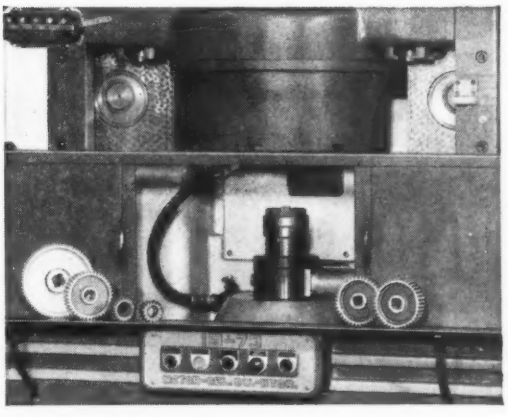
for
AUTOMOTIVE GEARS

"Balances output of 8 double thread hobs plus more accurate cutting, less shaving time." (Transmission Manufacturer)

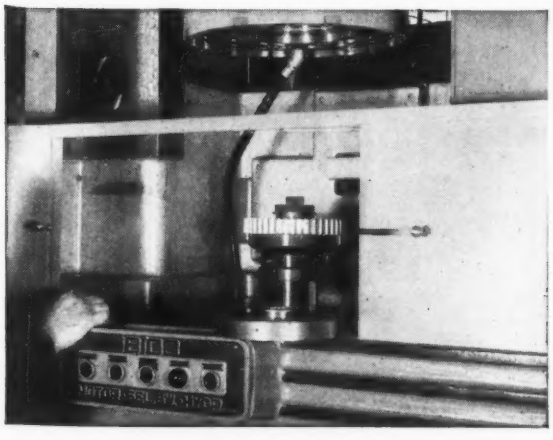


for
SMALLER PRODUCERS

"One Shear-Speed* with interchangeable tooling produces all these parts for stoker drives—with time to spare." (Stoker Mfgr.)



If you have not yet investigated how the Shear-Speed* can cut costs and step up your output of gears, clutches, and other external shapes, write today for Bulletin #1800-47.

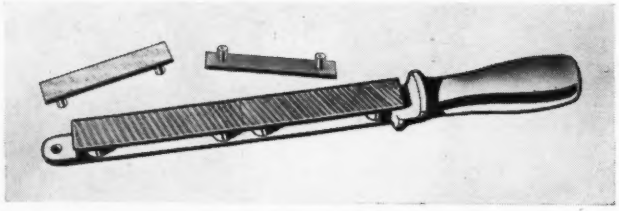


and now for
BIG GEARS

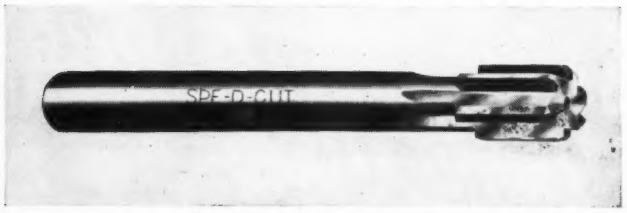
The new Shear-Speed* 18103, for gears, clutches, and other external shapes up to 10 inch O.D. and 2¾ inch thick.

ORIGINATORS of GEAR-SHAVING

MICHIGAN TOOL CO.
7171 E. McNICHOLS RD.
DETROIT 12, U.S.A.



Severance File with Ground-tooth Cemented-carbide Segments



"Spe-D-Cut" Reamer Developed by the Wendt-Sonis Co.

Severance Hand Files of Cemented Carbide

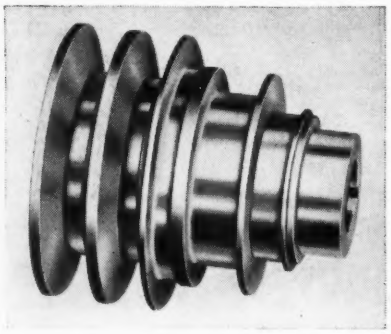
Hand files of cemented carbide with ground teeth have been placed on the market by the Severance Tool Industries, Inc., 636 Iowa St., Saginaw, Mich. The new file can be obtained with either twenty or thirty teeth per inch and in 3/4- or 1 1/4-inch widths. It comprises a combination handle-holder, on which two carbide segments are mounted. The handle is shaped to fit the hand, and has an arm rest and knuckle guard. A coarse and a fine segment can be used on the regular holder or several segments can be mounted on holders of special design.

Tests and initial applications indicate that these ground carbide files will cut steels up to a Rockwell hardness of 62 C. This permits filing speeds many times faster than those possible when using steel files. Thus burrs can be removed from steel parts while they are still revolving at the high speeds used for carbide turning. The carbide segments can be removed from the holder and returned to the manufacturer for regrinding. 104

Drive and Clutch Unit for Twin V-Belts

The newest addition to the line of "Ball-Lok" V-belt clutches manufactured by the V-Belt Clutch Co., 3757 Wilshire Blvd., Los Angeles 5, Calif., is the assembly designed for twin V-belts shown in the accompanying illustration. When the clutch is idling, the belts ride on free-turning bearings of double slip-ring design. When it is engaged for driving, the belts are gripped by and ride up on axially moved pulley side walls. Shifting force is applied to the walls of the open channel sleeve by shifter fork assemblies with suitable friction shoes. Hardened steel pins or bronze lugs operating in the channel exert engaging pressure, and yet have no connection when the clutch is idling. Models of this clutch unit with conventional bronze shifting collars are available.

The twin-belt model is rated at 5 to 10 H.P. The pulley diameter is 3 3/4 inches; length of the unit is 4 1/8 inches; weight, 3 pounds 6 ounces; and shaft sizes, 1, 1 1/8, and 1 1/4 inches. 105



Drive and Clutch Unit for Twin V-Belts

"Spe-D-Cut" Reamers

The Wendt-Sonis Co., Hannibal, Mo., has announced the development of a new line of reamers known as "Spe-D-Cut." Standardization on straight-shank styles and the size ranges most widely used has made it possible to offer this new line at a price range near that of high-speed steel reamers.

The new reamer is manufactured to precision tolerances (0.0005 inch on the diameter) and has diamond-lapped cutting edges. It can be used successfully both on ferrous and non-ferrous materials, and is available from stock in thirteen different diameters. A standard split-sleeve reamer driver can be used with the tool for mounting in taper-shank spindles. 106

L & N High-Sensitivity Galvanometer

A new compact Type E galvanometer has just been announced by the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa., which has its moving system, magnet, lamp, scale and lamp transformer in a single, compact case. The instrument can be placed on a bench or table and made ready for use by simply connecting it to a 115-volt, 60- or 50-cycle circuit. The available sensitivities are 0.5 microvolt and 0.005 and 0.0005 microamperes per millimeter. The instrument operates at a short period of only 3 seconds.

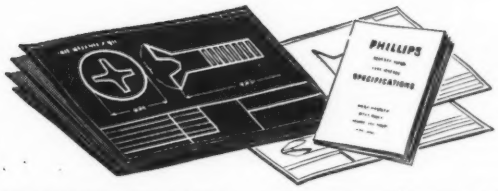
If a deflection carries or "shoots" the indicating "light-spot" of the galvanometer off the scale, a secondary spot appears which moves only one-tenth as far as the main spot and shows the direction of deflection and approximate magnitude of the required circuit-balancing adjustments. The indicating scale has fifty divisions of one millimeter each on both sides of zero.....107

High-sensitivity, Short-period Galvanometer

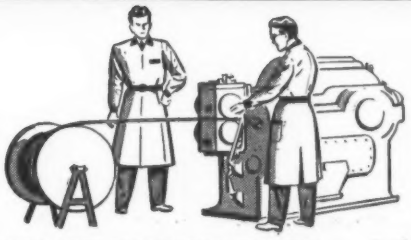
To obtain additional information on equipment described on this page, see lower part of page 220.

ONLY PHILLIPS RECESSED HEAD SCREWS

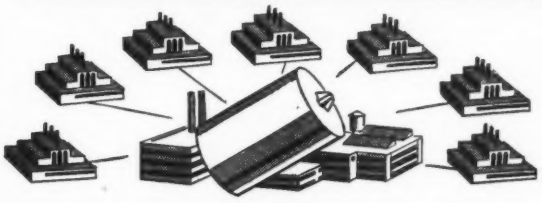
OFFER DIMENSIONAL UNIFORMITY INSURED BY CLOSE ENGINEERING CONTROL



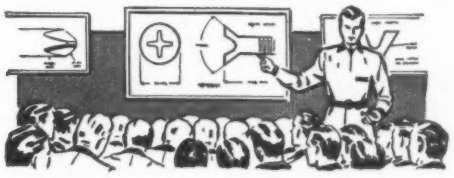
ESTABLISHED STANDARDS . . . Every manufacturer of Phillips Cross Recessed Head Screws is supplied with complete engineering and production data which prescribes precise dimensions and tolerances.



CENTRALIZED PRODUCTION TRAINING . . . And, before production is started on Phillips Screws, each plants' supervisory staff puts in an extended training period with Phillips engineers.



COMMON SOURCE OF RECESS FORMING TOOLS . . . Punches for forming the Phillips Cross Recess in all types and sizes of Phillips Screws are formed from master types at one plant. The manufacture of gauges for maintaining uniformity of Phillips Drivers and Bits are similarly centralized.



ENGINEERS' MEETINGS . . . Standards carefully established at the very beginning are rigorously maintained through meetings of "Phillips Recessed Head Standards Committee". Engineers from all plants meet to exchange ideas, discuss problems and learn about recent developments.

All these precautions to secure absolute dimensional uniformity are just part of the care taken to produce Phillips Cross Recessed Head Screws that give users *all* the advantage of a cross recess engineered for practical production.

Speed and ease of driving in production assembly demands that the driver and recess fit smoothly, perfectly, the same way every time, all the time. With Phillips Screws, you can depend on it.

GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS . . .

GET PHILLIPS *Recessed Head* SCREWS

Wood Screws · Machine Screws · Self-tapping Screws · Stove Bolts

25 SOURCES

American Screw Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
Elco Tool & Screw Corp.
The H. M. Harper Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Seaboard Screw Corp.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wales-Beech Corp.
Wolverine Bolt Company

GET THIS NEW BOOKLET of facts that prove the top value, top economy of Phillips Recessed Head Screws. It's free . . . use the coupon.

Phillips Screw Mfrs.,
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1800 Industrial Trust Bldg.
Providence, R. I.

Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

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Company _____

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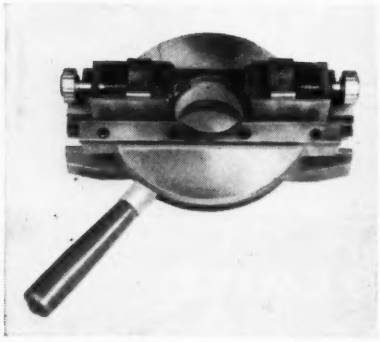


Nutmeg Quick-acting Self-centering Vise

Nutmeg Double-Cam-Actuated Vise

Nutmeg Tool & Products, Norwich, Conn., is now manufacturing an improved double-cam-actuated vise for holding work while performing milling, drilling, and threading operations.

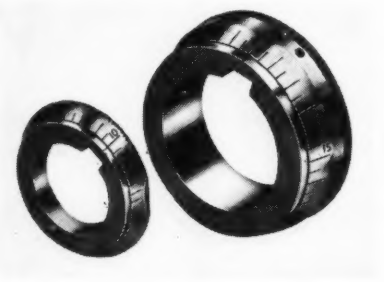
One motion of the operating handle serves to automatically center the work, regardless of dimensional variation, and to lock it securely in place. A return motion releases the work and removes the chips. Special jaws can be provided for holding parts of unusual shapes. A 3-inch hole through the vise permits work to drop through into a tote box...108

R and L Acorn Die-Holder

An improved type acorn die-holder will soon be available in various sizes from R and L Tools, 1825 Bristol St., Nicetown, Philadelphia 40, Pa. A large ring washer, keyed in place between the cap and the lock-nut, and spanner-wrench notches in both the cap and the lock-nut, as shown in the illustration, are features of this new die-holder which serve to speed up and simplify the positioning and tightening of the die in the holder. 109

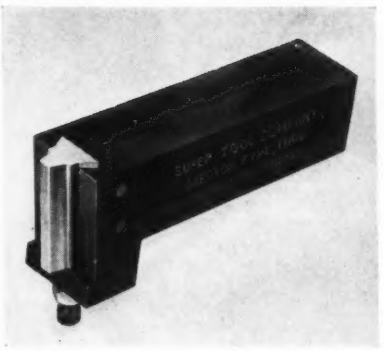
Expanding Milling-Cutter Spacing Collars

The George Scherr Co., 200 Lafayette St., New York 12, N. Y., has announced a new line of "Euco Micrometric" expanding milling spacers designed for use in gang and straddle milling operations. These new spacers are hardened and ground throughout, heat-treatment giving them a Brinell hardness of 590 and a tensile strength of 130 tons per square inch. The fine threads on the spacers withstand any pressure used in tightening the cutters on the milling machine arbor.



Milling-cutter Spacing Collars

These new Euco spacers enable the set-up man to quickly and accurately assemble milling cutters in any desired combination and to an accuracy of 0.0005 inch. The spacers consist of an outer sleeve moving telescopically on a fine thread and an inner sleeve keyed to the arbor. The fine adjustment is made by turning the outer sleeve, which has 0.0005-inch graduations. 110



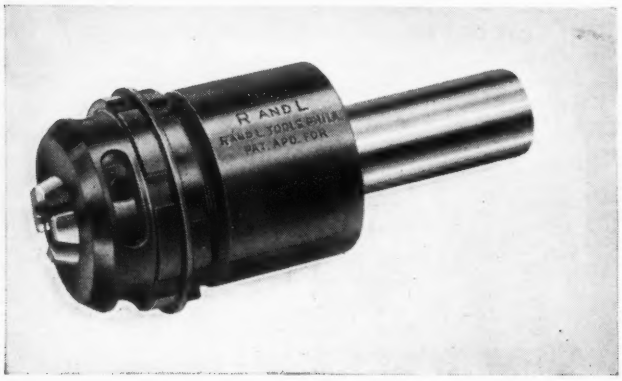
Ejector Type Tool Made by the Super Tool Co.

Super Ejector Type Tool

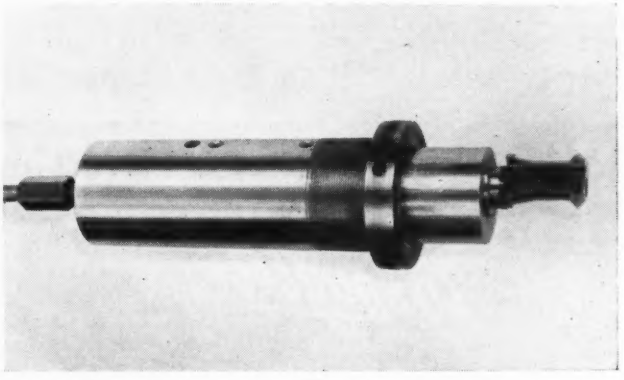
A new special-purpose ejector type tool for cutting the belt track on the periphery of a pulley and facing the edges at the same time has been developed by the Super Tool Co., 21650 Hoover Road, Detroit 13, Mich. The success of this tool on standard turning jobs is said to have led to the development of many designs for special work, such as special sized inserts for heavy or light cuts. Tools can be made to suit the designs of customers or they can be designed and produced to meet written specifications. 111

Maxwell Automatic Recessing Tool Holders

The Maxwell Co., 386 Broadway, Bedford, Ohio, has announced the extension of its standard line of "Max-Well-Made" recessing tools to include a new series developed especially for use with machines having automatic feeds. These tools are designed for increased feeds, as well as for the reduced feeds used for internal forming work.



R and L Acorn Die-holder of Improved Design



Maxwell Draw-bar Operated Recessing Tool-holder

To obtain additional information on equipment described on this page, see lower part of page 220.

First All-Welded Crankcase Reduces Costs 54% ...Improves Appearance

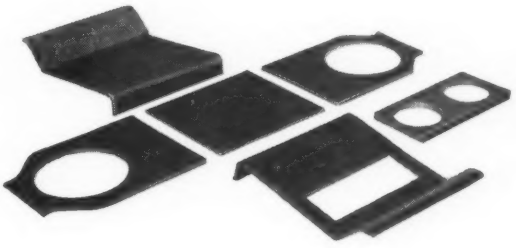
By M. V. Caldwell, President
Globe Mfg. and Compressor Co.
Battle Creek, Michigan

THE redesign of our air compressor crankcases was born of necessity. Past difficulties in obtaining parts of the conventional construction for the original design prompted us to convert to welded design and led to what we believe is the first all-welded crankcase used in the compressor industry. The changeover was accomplished gradually, one step at a time so as not to affect production schedules.

Fig. 1 shows the original construction of cylinder and crankcase assembly for our 20 C.F.M. air compressor. This unit had a total weight of 151½ lbs. and cost $29.57 for material and direct labor. In the first step toward welded construction, the lower crankcase only (Fig. 2) was welded and assembled to the cylinder and upper crankcase castings. The total weight of this design is 85 lbs., and its cost is $25.81 for material and labor.

Our success with the welded lower crankcase encouraged a further development shown in Figs. 3 and 4. This all-welded crankcase weighs 23 lbs. and costs only $13.76. A comparison of the original cost of $29.57 with this reduced cost of $13.76 represents an over-all production saving of 54%.

Fig. 3. Fabricated steel parts for all-welded crankcase.



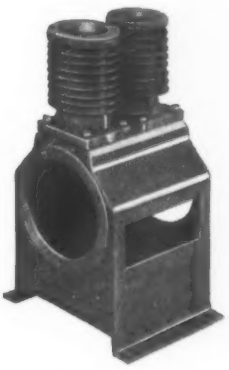


Fig. 4. Present all-welded crankcase and cylinder assembly. Cost $13.76.

Fig. 1. Cylinder and crankcase assembly originally used. Cost $29.57.

Fig. 2. Intermediate step in welded development. Welded lower crankcase assembled to upper crankcase and cylinders.

The component parts for the all-welded crankcase are fabricated from ⅛" and 3/16" sheared mild steel plate as shown in Fig. 3. The parts are clamped solidly in a universal jig for downhand welding, and then we weld inside and outside with 3/16" "Fleetweld 5" electrode using 300-amp. Lincoln "Shield-Arc" Welders.

Several indirect benefits are gained with our welded design. In order to reach the required production, new and more elaborate patterns for grey iron would have been required at a cost of approximately $4,000 besides the expensive heavy fixtures necessary in machining the unwieldy cylinder casting. This cost has been avoided. In addition, an exceptionally high scrap loss, originally experienced in the lower crankcase, has been eliminated by the welded steel construction.

Savings made in weight are important to us because our selling prices are made f.o.b. the destination. Also reduction in base size from 20" x 26" to 16" x 22" is a great advantage in export shipping costs. Last, but by no means least, the welded construction simplifies painting and finishing to produce a more pleasing appearance and smoother finish.

The tools are operated by a draw-bar having a telescopic adjustment for tool location. Circular form cutters, either high-speed steel or carbide-tipped, can be used. Adjustment for depth of recess is made readily by a collar on the tool-holder body. These tool-holders are available in a wide range of sizes to accommodate all standard types of slide tool-holders. 112

Norflex Cut-Off Wheels

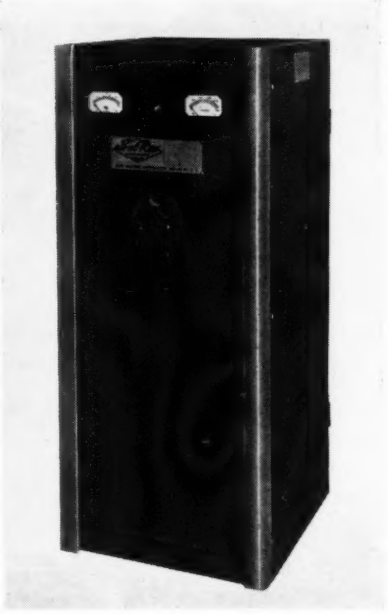
The Norton Co., Worcester, Mass., has recently brought out a new line of reinforced "Norflex" cut-off wheels designed to meet the need for high-speed flexible type cut-off wheels for foundry use which can be safely operated at a speed of 16,000 surface feet per minute. The new wheels are made of tough, sharp alundum abrasive and a special resinoid bond, especially suited for cutting off non-ferrous gates and risers on various foundry cut-off machines where rubber bonded wheels are normally used or where breakage is the chief factor to be considered.

The reinforced construction of these wheels serves to give them an unusually high safety factor against breakage, an exceptionally fast cutting action and a low rate of wear. In tests, these wheels have withstood, without breaking, side pressures up to 400 pounds, although they were subjected to excessive bending. "Norflex" reinforced wheels are now available in diameters of 14, 16, and 20 inches and in thicknesses of 5/32 and 3/16 inch. Three grades are supplied to suit different operating conditions. 113

"Norflex" Flexible Type Cut-off Wheel

Sel-Rex Selenium Rectifier

A 750-ampere "Sel-Rex" selenium rectifier for use in barrel plating operations is being manufactured by the Bart-Messing Corporation, 45 Morgan Ave., Brooklyn 6, N. Y. This rectifier



Sel-Rex Selenium Rectifier Made by Bart-Messing Corporation

is designed specifically for economical and safe plating with zinc, cadmium, nickel, and copper. The unit is equipped with a tap switch for voltage control from 9 to 12 volts, and is capable of operating one or more barrels, depending on the size and load.

Safety features include positive overload protection in direct-current bus circuits; magnetic contactor which disconnects the unit to protect the power line in case of a short circuit in the tanks; positive protection against ventilation restriction; and shut-off for the rectifier, which operates automatically if the air intake is blocked. Doors with quick-acting fasteners facilitate maintenance. The rectifier cabinet is mounted on ball-bearing casters and is 56 inches high, 22 inches wide and 24 inches deep. 114

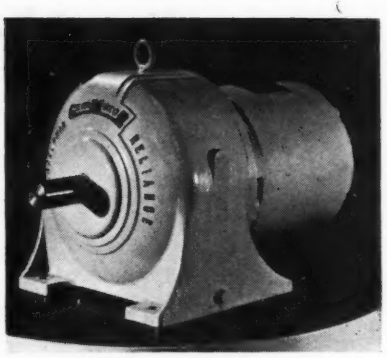


Fig. 1. Reliance Gearmotor Manufactured Jointly by Reliance Electric & Engineering Co. and Philadelphia Gear Works

Reliance Gearmotors

A completely new gearmotor of unusually compact design has been developed and will be produced jointly by the Reliance Electric & Engineering Co., 1076 Ivanhoe Road, Cleveland 10, Ohio, and the Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia 34, Pa.

The new gearmotor is to be built in six basic sizes covering a range of 1 to 60 H.P. The new helical type horizontal units are complete integral alternating- or direct-current motors with flange mounting, and operate in a speed range of from 7 1/2 to 780 R.P.M.

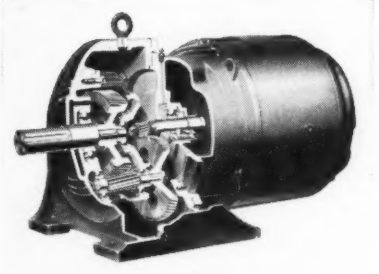


Fig. 2. Cross-sectional View of Double-reduction Reliance Gearmotor

Single, double, and triple reduction units will be available in each size.

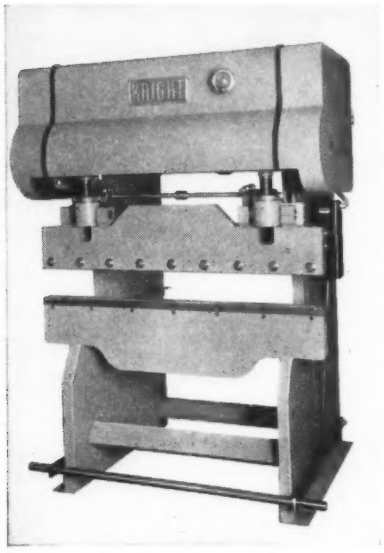
A vertical type gearmotor is also available for application on machines having vertical driveshafts. A new Reliance "Chemical" motor designed especially for applications where corrosion resistance is important is also being brought out in 1/2- to 20-H.P. sizes having speeds ranging from 600 to 3600 R.P.M. 115

To obtain additional information on equipment described on this page, see lower part of page 220.

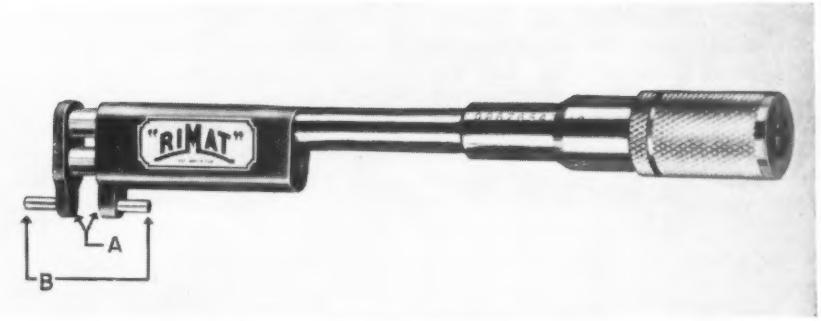
Knight All-Steel Welded Press Brake

Three new all-steel welded press brakes have been developed by the Knight Machinery Co., 1001 S. Delaware St., Indianapolis 2, Ind., to meet the demand for smaller, less expensive machines which can be used for a variety of small size work, thus relieving larger, more expensive equipment for heavy work. Features of these new press brakes include heavy welded construction, micrometer dials for out-of-parallel adjustment of the ram, and infinitely variable speed adjustment.

Extra equipment consisting of front-operated gages, extra wide platen, light in back of the ram, and standard and special dies is also available. The machines are made in 24-inch, 18-gage; 36-inch, 18-gage; and 48-inch, 18-gage capacities. 116



All-steel Welded Press Brake Made by Knight Machinery Co.



Rimat Longitudinal Duplex Micrometer

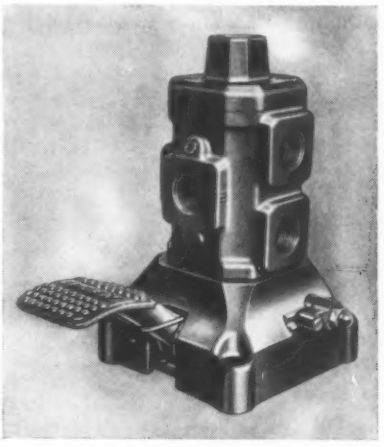
Longitudinal Duplex Micrometer

A Model L longitudinal duplex micrometer has been added to the "Rimat" line of micrometers introduced by the Richards Machine Tool Co., 124 S. Isabel St., Glendale 5, Calif. This new instrument, which is designed especially for inside work, will take both inside and outside measurements of grooves and flanges on the inside of a bore. It is small enough to be used in a hole or opening 1/2 inch in diameter. Measurements can be read while the instrument is held in place. External measurements are made between points *A*, shown in the illustration, while internal measurements are made between points *B*. 117

Multi-Operation Carbide-Tipped Cutting Tools

The R. F. Cook Mfg. Co., 2732 Second St., Cuyahoga Falls, Ohio, has developed a new line of multi-operation carbide-tipped cutting tools. These tools are adapted for simultaneously chamfering a small bore, facing a step, reaming a diameter, chamfering a diameter, reaming a counterbore diameter, and chamfering a counterbore diameter.

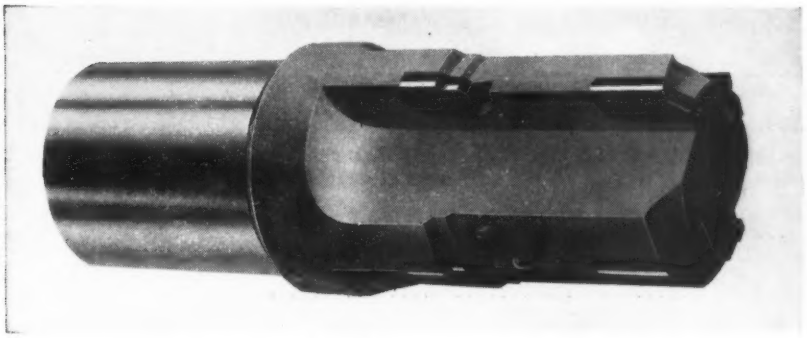
The particular tool illustrated was developed to chamfer, ream, and counterbore master cylinders for automotive type brakes, holding the work to tolerances of 0.0005 inch, both on diameters and on the length of the steps. The tools in the new line are so designed that they can be resharpened without affecting the dimensions of the shoulder lengths or the diameters, as the teeth are of the form-relieved type. 118



Logan Foot-operated Hydraulic Control Valve

Logan Foot-Operated Control Valve

The Logansport Machine Co., Inc., Logansport, Ind., has brought out a foot-operated four-way valve designed for latching or free control of double-acting hydraulic cylinders. This valve has no seats or packings other than the stem seals at each end, and is of the balanced pressure, sliding piston type. It is unusually compact, the base area of the various sizes ranging from 5 3/8 to 7 1/8 square inches.



Multi-Operation Carbide-tipped Tool Developed by the R. F. Cook Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 220.

The valve is available in standard sizes from 1/4 to 1 inch, and is designed for oil hydraulic service at pressures up to 1500 pounds per square inch. Special valves for operating pressures up to 2500 pounds per square inch in oil hydraulic circuits, and up to 1500 pounds per square inch in water hydraulic circuits can also be supplied. A conveniently positioned lever permits the valve to be quickly set for either latching or instant-release control. 119

"Powerpak" Hydraulic Control

A "Powerpak" control for hydraulic systems capable of exerting precision-controlled forces by finger-tip actuation from 0 to a maximum of 1500 pounds per square inch has been announced by Electrol, Incorporated, Kingston, N. Y. This compact control consists of a hand pump, reservoir, two selector valves, and relief and check valves. It is 4 1/2 inches high and has a base 3 1/4 by 4 inches. The reservoir capacity can be varied to suit requirements. A power-driven pump can be utilized by removing two plugs to connect pump pressure and suction lines to the unit. 120

"Powerpak" Hydraulic Control Unit

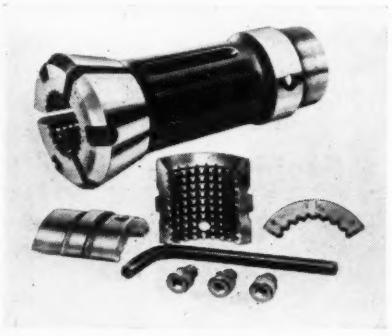


Fig. 1. Sheffer "SM" Master Collet with Interchangeable Pads

Sheffer Master Collet and "Economy" Stock Pusher

A new Style "SM" master collet has been announced by the Sheffer Collet Co., Traverse City, Mich., in which pads made to accommodate any size or shape of bar stock within the capacity of the machine can be changed without removing the collet from the spindle. The pads are positively held in place by standard socket set-screws that lock in T-slots in the face of the collet, as shown in Fig. 1. These collets are available for all machines having a capacity of 1 inch or larger.

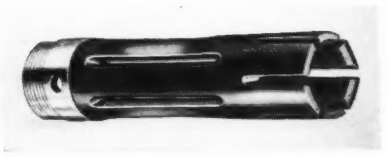


Fig. 2. "Economy" Stock Pusher Made by the Sheffer Collet Co.

The "Economy" stock pusher, shown in Fig. 2, designed to feed stock to the end of the bar is another new product of the Sheffer Collet Co. Feeding is accomplished by a dual bearing, one in the midsection and one in the nose of the pusher, an arrangement that provides an exceptionally long bearing and thus requires a correspondingly lighter spring tension to accomplish positive feeding. The pusher is furnished for any stock size from 1/4 inch up and for any machine. 121

* * *

Use of Incentive Systems in Industry

According to the *Labor Information Bulletin*, nearly a third of the plant workers in manufacturing industries studied by the Bureau of Labor Statistics during 1945 and 1946 were paid on an incentive basis. Piece-rate plans, almost all based on individual output, were most common, being used by five out of every six plants with incentive systems.

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described in this section is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in May, 1948, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Fill in your name and address on blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

NAME..... POSITION OR TITLE.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

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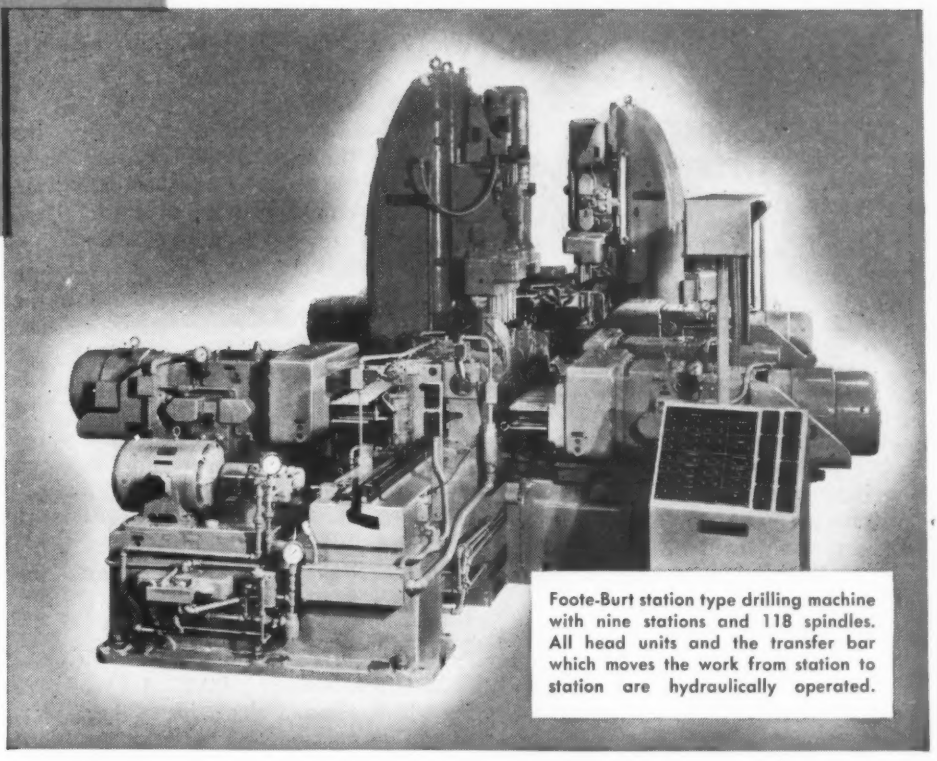
CITY..... STATE.....

RUST SLUDGE KEEP 'EM OUT!



Foote-Burt station type drilling machine with nine stations and 118 spindles. All head units and the transfer bar which moves the work from station to station are hydraulically operated.

Photo courtesy The Foote-Burt Company

Keep hydraulic systems clean . . . use *Texaco Regal Oils (R&O).*

TEXACO REGAL OILS (R & O) keep rust and sludge out of hydraulic systems. One user says: "Since using *Texaco Regal Oil (R & O)* we have greatly reduced machine down-time." Another says: "Since using *Texaco Regal Oil (R & O)* we have experienced smoother operation with no shut-downs or part replacements."

Texaco Regal Oils (R & O) are turbine-grade oils containing special inhibitors to prevent the rust and sludge formations that cause costly stoppages. They are also processed to prevent foaming. Their use assures more dependable operation . . . fewer production interruptions . . . lower maintenance costs.

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Let a Texaco Lubrication Engineer give you full details. Just call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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FOR ALL HYDRAULIC UNITS

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New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 226 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the May, 1948, Number of MACHINERY

Flexible Couplings

AMERICAN FLEXIBLE COUPLING Co., Department C-1, Erie, Pa. Booklet entitled "Relief from Bearing Wear Grief," showing how the use of proper flexible couplings prevents "down time" caused by bearing failure, shaft failure, and damaged equipment. Design and plant enginers, plant operating and management executives, and maintenance men can obtain copies without charge by writing directly to the company, attention of R. M. Campbell; to others the price is $1.

Precision Measuring Tools

VAN KEUREN Co., 178 Waltham St., Watertown, Mass. Handbook No. 34, containing 208 pages covering precision measuring tools, including 130 pages of engineering formulas and tables. The book contains new formulas and tables for the exact measurement of screw threads and new methods of measuring the included angle of screw threads. A limited number of copies are available to executives who request them on business stationery. Copies for general distribution cost $1 each.

Forged Products

A. FINKL & SONS Co., 2011 Southport Ave., Chicago 14, Ill. Catalogue containing descriptions of die-blocks, steel, forging equipment repair parts, and forgings. A section includes engineering tables. Copies may be obtained by writing on a company letter-head addressed to A. Finkl & Sons Co.

Pre-Plated Metals

AMERICAN NICKELOID Co., Peru, Ill. Booklet G, describing Nickeloid pre-plated metals and their applications. Manufacturers, product designers, or sales executives can obtain a copy by writing on a business letter-head addressed directly to the company.

Quality-Control Service for Tool Steel Users

LATROBE ELECTRIC STEEL Co., Latrobe, Pa. Bulletin describing a service for supplying hardened inspection disks which permit the user to check in advance the structure of designatized high-speed and high-carbon, high-chromium steel as it will appear after heat-treatment and processing...1

Run-Out Inspection Machine

TIMKEN ROLLER BEARING Co., Canton 6, Ohio. Folder describing the "Concentrometer" a machine for measuring bearing run-out in millionths inch, and for precision checking of various circular parts for concentricity and squareness of face. 2

Multiple-Purpose Special Machines

SNYDER TOOL & ENGINEERING Co., 3400 E. Lafayette, Detroit 7, Mich. Folder describing an automatic transfer type machine for engine blocks and a six-station, double-end rotary machine for bronze castings. 3

Welding Rods for Salvaging Castings

EUTECTIC WELDING ALLOYS CORPORATION, 40 Worth St., New York 13, N. Y. Leaflet descriptive of the use of eutectic low-temperature welding rods in salvaging cast iron, bronze, aluminum, and malleable castings. 4

Bench Type Micrometer

PRATT & WHITNEY DIVISION NILES-BEMENT-POND Co., West Hartford 1, Conn. Circular 497, describing the bench type Supermicrometer for measuring directly to 0.0001 inch with controlled pressure. 5

Face Milling Cutters

CONTINENTAL TOOL WORKS, DIVISION OF EX-CELL-O CORPORATION, 1200 Oakman Blvd., Detroit 6, Mich. Bulletin 60181, describing face milling cutters with high-speed steel or carbide-tipped inserted blades. 6

Taps, Dies, and Reamers

UNION TWIST DRILL Co., BUTTERFIELD DIVISION, Derby Line, Vt. Catalogue 23, describing the company's lines of taps, dies, screw plates, and reamers. Technical data and standards are included. 7

Electrical Connectors

HUGH H. EBY, INC., 4754 Stenton Ave., Philadelphia, Pa. Catalogue describing sockets, plugs, connectors, jacks, terminal strips, binding posts, and similar supplies for the electronic and electrical industries. 8

Aluminum Sheet and Plate

REYNOLDS METALS Co., ALUMINUM DIVISION, 2500 S. Third St., Louisville 1, Ky. Booklet containing technical information on aluminum sheet and plate, including alloys, gages, sizes, machinability, weldability, etc. 9

Automatic Steel Disintegrator

ANSALDI TOOL & ENGINEERING Co., 4744 Twelfth St., Detroit 8,

Mich. Catalogue describing an automatic disintegrator for removing taps, drills, studs, reamers, etc., from die sections, and other parts. 10

Brinell Production Testing Machine

STEEL CITY TESTING MACHINES, INC., 8843 Livernois, Detroit 4, Mich. Catalogue describes the Brinell Model KDR hardness testing machine for checking up to 800 pieces an hour. 11

Low-Temperature Melting Alloys

CERRO DE PASCO COPPER CORPORATION, Department D-7, 40 Wall St., New York 5, N. Y. First of a series of sheets describing applications of low-temperature melting alloys. 12

Industrial Adhesives

MINNESOTA MINING & MFG. CO., 901 Fauquier Ave., St. Paul 6, Minn. Booklet entitled "3M Adhesives in Industry" describing bonding and sealing operations, as well as protective coatings for metal. 13

Fractional-Horsepower Motors

TORQ ELECTRIC CORPORATION, 1077 Interstate St., Bedford, Ohio. Bulletin describing the company's line of fractional-horsepower motors with "Syncrosnap" starting switch. 14

Resistance Welding Tips

ACME ELECTRIC WELDER CO., 2618 Fruitland Road, Los Angeles 11, Calif. Catalogue 502, describing a line of resistance welding tips and holders that are made from Acmeloy, Superloy, and Stainaloy. 15

Motorized Gear Speed Reducers

D. O. JAMES GEAR MFG. CO., 1140 W. Monroe St., Chicago 7, Ill. Catalogue 46-47, containing 120 pages of engineering data on motorized gear speed reducers...16

Metal Moldings

LOXIT MOLDING CO., 1217 W. Washington Blvd., Chicago 7, Ill. Catalogue 3-48, describing metal moldings of all kinds, as well as a line of tools and accessories used in applying moldings. 17

Nickel-Alloy Steels

INTERNATIONAL NICKEL CO., INC., 67 Wall St., New York 5, N. Y. Booklet containing data on the properties of heat-treated wrought nickel-alloy steels and their heat-treatment. 18

Flexible Monel Metal Tubing

TITEFLEX, INC., 519 Frelinghuysen Ave., Newark 5, N. J. Folder describing characteristics and properties of Titeflex Monel metal flexible tubing. 19

Circular Saw Blades

MOTCH & MERRYWEATHER MACHINERY CO., Penton Bldg., Cleveland 13, Ohio. Bulletin 200, describing segmental, solid, slitting type, and special Triple-Chip saw blades. 20

Diamond Compound

ELGIN SAPPHIRE PRODUCTS DIVISION ELGIN NATIONAL WATCH CO., Aurora, Ill. Circular describing Hyprez diamond compound for finishing steel, carbides, and other hard materials. 21

Meehanite Castings

MEEHANITE METAL CORPORATION, Pershing Square Bldg., New Rochelle, N. Y. Bulletin 28, containing the answers to seven fundamental questions about Meehanite metal. 22

Diamond Tools

DIAMONDS AND TOOLS, INC., DIVISION OF WALL COLMONOY CORPORATION, 19345 John R, Detroit 3, Mich. Folder describing various diamond tools for cutting and dressing. 23

Heating Non-Ferrous Alloys

SURFACE COMBUSTION CORPORATION, Toledo 1, Ohio. Bulletin SC-136, describing recommended methods of heating and annealing copper, brass, and other non-ferrous alloys. 24

Transmission Belts

L. H. GILMER CO., DIVISION OF U. S. RUBBER CO., Tacony, Philadelphia 35, Pa. Folder announcing the new Gilmer endless timing belt with teeth and Speedage-Kord belt. 25

Magnetic Chucks for Milling

ROCKFORD MAGNETIC PRODUCTS CO., INC., 1302 Eighteenth Ave., Rockford, Ill. Bulletin describing the application of "Power-Grip" electromagnetic chucks on milling machines. 26

Form Tools and Mounted Wheels

J & S TOOL CO., 477 Main St., East Orange, N. J. Two folders describing form tools, mounted grinding wheels, and spindle adapters.....27

Hydraulic Equipment

ADEL PRECISION PRODUCTS CORPORATION, Burbank, Calif. Booklet entitled "Engineered Hydraulics," describing hydraulic pumps, control valves, and cylinders.....28

Hydraulic Universal Grinding Machines

LANDIS TOOL CO., Waynesboro, Pa. Catalogue J-48, describing the 14- and 18-inch Type C hydraulic universal grinders. 29

Infrared Applications

WESTINGHOUSE ELECTRIC CORPORATION, LAMP DIVISION, Bloomfield, N. J. Booklet A-3817, describing radiant-heat processing with infrared lamps. 30

Carbide Drill-Jig Bushings

METAL CARBIDES CORPORATION, Youngstown 5, Ohio. Bulletin BC-48, listing eight hundred sizes of Talide (tungsten-carbide) drill-bushings.....31

Cold-Heading Alloy

AMPCO METAL, INC., 1745 S. 38th St., Milwaukee 4, Wis. Bulletin 88, describing Ampcoloy 49, a new aluminum-bronze cold-heading alloy. 32

Lubrication Slide-Rule

FISKE BROTHERS REFINING CO., LUBRIPLATE DIVISION, Newark 5, N. J. Slide-rule designed to facilitate the selection of the correct lubricant for various uses.....33

Computing Bearing Loads

NEW DEPARTURE DIVISION, GENERAL MOTORS CORPORATION, Bristol, Conn. Book containing data for engineers and designers on how to compute bearing loads...34

Metal-Cleaning Solvents

DUBOIS CO., Cincinnati 3, Ohio. Booklet describing the uses and

physical characteristics of Actusol detergent and solvents employed for metal cleaning. 35

Taper Serrated Shafts and Pinions

PITTSBURGH GEAR & MACHINE Co., Pittsburgh 22, Pa. Circular descriptive of taper serrated shafts and pinions designed to provide greater strength and longer life. 35-A

Lubricants for Die-Casting

G. W. SMITH & SONS, INC., 5400 Kemp Road, Dayton 3, Ohio. Folder describing the properties and uses of four grades of "Die Slick" for lubricating die-casting dies and machines. 36

Cyclic Annealing

AJAX ELECTRIC CO., INC., Frankford Ave. at Delaware Ave., Philadelphia 23, Pa. Bulletin 121, describing the cyclic annealing of forgings, wire, rod, stampings, and castings. 37

Pipe-Bending Machines

PEDRICK TOOL & MACHINE CO., INC., 3638 N. Lawrence St., Philadelphia 40, Pa. Booklet containing operating instructions for pipe-bending machines. 38

Beryllium-Copper Spring Material

BERYLLIUM CORPORATION, Reading, Pa. Technisheet No. 2, giving data on Berylco 25s, a beryllium-copper spring material. 39

Arc-Welders

HOBART BROTHERS CO., Box EW-123, Troy, Ohio. Catalogue EW123, describing the Hobart Multi-Range line of arc-welders, as well as electrodes. 40

Vibration Control

KORFUND CO., 48-71 Thirty-Second Place, Long Island City 1, N. Y. Bulletin Vc-500, describing the use of Armstrong "Vibracork" for vibration control.....41

Variable-Speed Controls

REEVES PULLEY CO., Columbus, Ind. Folder describing variable-speed control units and their applications. 42

Ball-Making Machines

KOEHLER & SONS, Horsham, Pa. Pamphlet illustrating and describing automatic precision ball-making machines. 43

Cut-Off Wheels

NORTON CO., Worcester 6, Mass. Folder describing the Norflex high-speed, flexible cut-off wheels for foundry use. 44

Assembly Bins

GORDON L. HALL CO., Old Lyme, Conn. Catalogue 9, describing Binrack assembly bins. 45

Powdered-Metal Parts

MICHIGAN POWDERED METAL PRODUCTS CO., INC., Northville, Mich. Bulletin descriptive of the company's facilities for manufacturing powdered-metal parts.....46

Carbide-Tipped Drills

WHITMAN & BARNES, Detroit 16, Mich. Circular descriptive of carbide-tipped masonry drills with spiral flutes. 47

New Officers of A.S.T.E

The American Society of Tool Engineers, at its recent meeting in Cleveland, elected the following officers: Irwin F. Holland, president; R. B. Douglas, first vice-president; H. L. Tigges, second vice-president; V. H. Ericson, third vice-president; George A. Goodwin, treasurer; and W. B. McClellan, secretary.

Mr. Holland has been with Pratt & Whitney, Hartford, Conn., since 1915, and has been general superintendent of the Small Tool and Gage Division since 1939. Mr. Douglas is president of Godscroft Industries Ltd., Montreal, Canada; Mr. Tigges is vice-president of Baker Brothers, Inc., Toledo, Ohio; Mr. Ericson is vice-president of Johnson de Vou, Inc., Worcester, Mass.; Mr. Goodwin is chief process engineer of the Master Electric Co., Dayton, Ohio; and Mr. McClellan is special engineer of the Gairing Tool Co., Detroit, Mich.

* * *

Gearing Industry Reports Increase

The gearing industry, as represented by the American Gear Manufacturers Association, reports an increase of 6.8 per cent in orders during the year 1947 compared with 1946. Orders for open gearing were higher in 1947 by 6.2 per cent, while those for enclosed gear drives showed an increase of 7.5 per cent. These figures do not include turbine or propulsion gearing.

To Obtain Copies of New Trade Literature

listed in this section (without charge or obligation), fill in below the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue (May, 1948) to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

No.	No.	No.	No.	No.	No.	No.	No.	No.

NAME..... POSITION OR TITLE.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

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BUSINESS ADDRESS.....

CITY..... STATE.....

By E.S.S.

BETWEEN GRINDS

Collector (300 Pounds Worth)

In February on this page we asked how long our readers keep back copies of MACHINERY. Here is a man out for the record: "I have been a subscriber to MACHINERY since 1902. I have all the copies including Data Sheets, except the advertising pages. I used to refer to them quite often when my vocation was machine and tool design, but now only read the magazine to keep up to date on new ideas and developments. If any of your subscribers (or you) are interested in back numbers of MACHINERY, write to me."—C. Robert Libby, 5818 Hamilton Ave., Cincinnati 24, Ohio. If you had saved the advertising sections too, Mr. Libby, we calculate you would have, roughly, 1500 pounds of our avoirdupois.

Huzza for Uncle

From Lodz, Poland, one of our subscribers writes: "I enjoy the MACHINERY (paid by my uncle in U.S.A. God bless him — it's only good news in work I love)."

The Editor Accepts a Challenge

In March, a letter arrived from a harassed sales engineer, declaring his interest in MACHINERY'S department "The Sales Engineer and His Problems." Preface over, the gentleman tossed his hat in our sales engineer ring, saying, "I doubt very much if you plan an article such as I would like to prepare for you—and would *challenge* you to publish. The article would look in the other direction, and show that the most serious problems faced by the sales engineer today are not in the field, but right inside his own company." We are no Cyranos here, but a challenge is not to be ignored. Our seconds (alias secretaries) exchanged words and sharpened pencils. The outcome of this epistolary skirmish may now be seen on page 185.

Woudl You Know?

Writing to ASTE Chapter 62, we were confronted with an address on the letter-head which read "3020 Woudlwan Avenue, Wesleyville, Pa." Could Woudlwan be Welsh, Wesley, or merely a printer's error? Through devious means we tracked down the name of the avenue which was, of course, Woodlawn.

Rebuttal

In March, 1946, we published an article "Sine Bar With Adjustable Blocks which prompted a British reader a short while ago to advise us:

"Mr. Manton's (author of the article—Ed.) design of sine bar suffers a grave defect. In place of the usual cylinder, Mr. Manton uses a prism. Surely the corner of the prism will show rapid signs of wear compared with the usual cylinder? For *every* setting of the bar, the corner of the prism is used. Every change in angle of setting entails a change in bearing line on the periphery of the cylinder. Wear on a cylinder is thus spread, whereas in Mr. Manton's sine bar it is concentrated on one corner."

Acting as middleman, we contacted Mr. Manton, who replied: "Our British friend must be quite technical—the wear would be microscopic. There is no friction at the contact points, therefore very little wear; should the worst happen, it is easily repaired, one easy grinding putting on new sharp corners in the proper place. Study the mechanism of the delicate, accurate Trommel Balance, used in laboratories all over the country, or the massive railroad scales, used the world over, or visit the Bureau of Standards in Washington, D. C., and learn how many times the 'prism,' or sharp corner—or even the knife edge—is depended upon for accuracy and stability. My sine bar is used frequently on accurate jobs, and is doing very good work."

Lady, We No "Cotton"

A woman correspondent who stuffs little animals with cotton by hand now wants a stuffing machine, we are informed. She did not specify whether these animals were the kind a taxidermist works with, like an owl, quail, or peacock, or whether they belonged to the nursery genus of Mickey, Dumbo, or Pluto. So few ladies write to us, we really wanted to help but, of course, the directory we consulted had no category "cotton stuffing machines for small animals." We did pick a firm under "Mchy: cotton stuffing and wadding," and hope the reference will fill the bill—or do we mean stuff it?

News of the Industry

Colorado and Texas

GEOFFROY CO., P.O. Box 67, Capitol Hill Station, Denver 6, Colo., has been appointed representative in Colorado, Utah, and Wyoming for the METAL CARBIDES CORPORATION, Youngstown, Ohio.

GEORGE REED, metallurgical engineer with the Timken Roller Bearing Co., Canton 6, Ohio, has been appointed sales engineer of the company's Steel and Tube Division, with headquarters in Houston, Tex.

Illinois and Indiana

WILLIAM P. GOOD has been appointed head of the department of applied welding engineering, and VIRGIL CARLSON director of the electrical engineering department of Mid-States Equipment Corporation, Chicago, Ill.

LINK-BELT CO., 307 N. Michigan Ave., Chicago 1, Ill., has appointed C. C. WILEY district sales manager at Baltimore, Md. JAMES TOMMIE BELL has been appointed sales manager at Birmingham, Ala.

ANDERSONS, INC., manufacturer of small tools, jigs, and fixtures, has moved into a new plant at 6603 Diversey Ave., Chicago, Ill.

LINK-BELT CO., BALL AND ROLLER BEARING DIVISION, has announced the appointment of ARTHUR E. MAHA as assistant sales manager for the central division, with headquarters at the Dodge plant, Indianapolis, Ind. LEWIS M. WATKINS, JR. has been appointed assistant sales manager for ball and roller bearings in the eastern division, with headquarters in Philadelphia.

BAKER-INDUSTRIAL TRUCK DIVISION, BAKER-RAULANG CO., 2168 W. 25th St., Cleveland 13, Ohio, has announced the appointment of HOPPER-GREEN CO., 1039 N. Pennsylvania St., Indianapolis, Ind., as sales representative.

Michigan and Wisconsin

HENRY R. GREENLEY has been appointed manager of the newly formed Morse-Formsprag sales department of the Morse Chain Co., Detroit 8, Mich. This department will market a new line of over-running clutches made by the Formsprag Co., Ferndale, Mich. Mr. Greenley will retain his duties as manager for the Morse coupling department.

ACME BROACH CORPORATION, East Third St. at Delaware, Lexington 47, Ky., announces that it has just completed a new plant at Milan, Mich., which will be used exclusively for the manufacture of broaching equipment. The main office of the company has been moved to Milan.

A. J. MCLAREN has been appointed sales engineer in Ohio for the Cross Co., Detroit, Mich., manufacturer of special machine tools. ROBERT W. LESMAN has been appointed sales engineer in Indiana.

DAVID D. WOOD, sales engineer on the staff of the Superdraulic Corporation, Dearborn, Mich., since July 1946, has been appointed general manager.

GEORGE BENNETT has joined the Harold F. Howard Co., management consultants, Fisher Bldg., Detroit, Mich., as consulting engineer.

L. C. WATSON, formerly with the Trumbull Mfg. Co., has been appointed manager of distributor sales for the Allen-Bradley Co., Milwaukee, Wis.

New England

BRIDGEPORT-DIAMOND MACHINE CO., 2362 Main St., Stratford, Conn., has been organized to manufacture face grinders, vertical surface grinders, and a full line of knife and blade grinders. This company has purchased the DIAMOND MACHINE CO., Philadelphia, Pa., from the AMERICAN ENGINEERING CO., also of Philadelphia. Engineering and sales offices have been moved to Stratford. Manufacturing facilities are expected to be in operation within a few months. JOHN T. KILBRIDE, who recently resigned as president of the Bridgeport Safety Emery Wheel Co., is president of the new company.

E. W. BLISS CO., Detroit, Mich., has announced that the New England sales and service headquarters for all machinery manufactured by the company will be handled in the future from 129 Church St., New Haven, Conn. FRANK BEATTIE has been named district manager, and FRED MILNES assistant district manager. FRED A. POWER, sales representative of the company in New England for the last thirty years, has retired and the company's Boston sales office has been closed.

JAMES Y. SCOTT, president of the Van Norman Co., Springfield, Mass., and president of the Morse Twist Drill Co., New Bedford, Mass., has been named special emissary by the American Society of Tool Engineers to the Institution of Production Engineers in England. Mr. Scott will attend a meeting of the British organization on May 28, at which he will present to the president of the Institution an honorary life membership in the American Society of Tool Engineers. The A.S.T.E. president holds a similar membership in the British Institution.

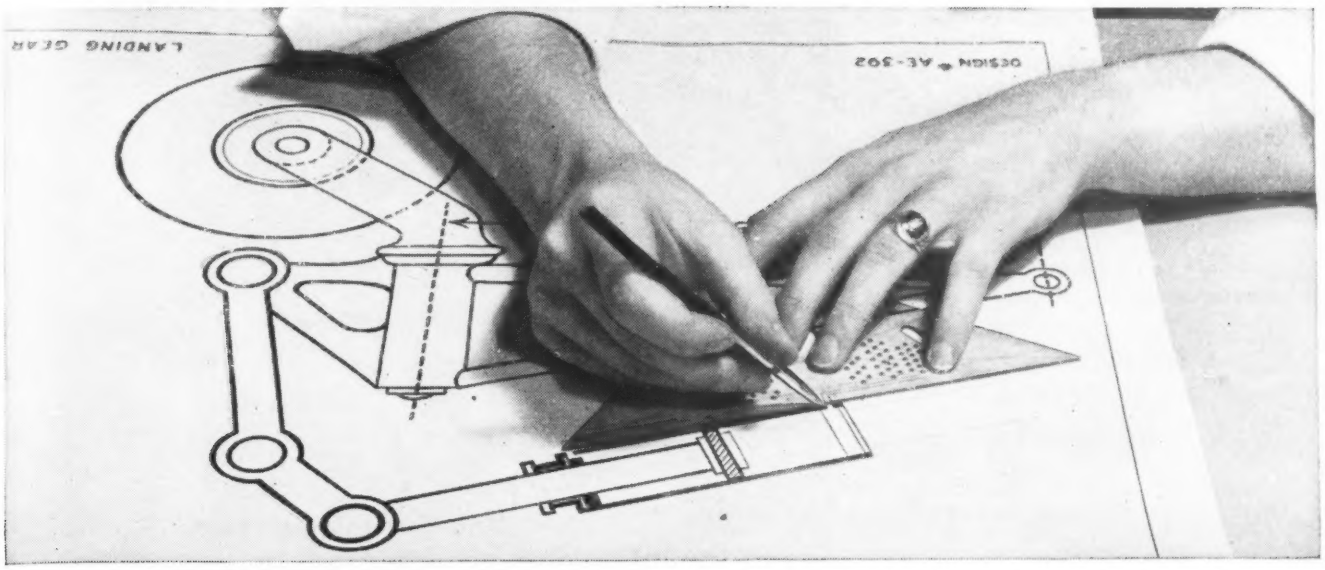
EDMUND L. SANDERSON and EDWARD BLAKE announce that their partnership, operating under the name of the WALTHAM MACHINE WORKS, Newton St., Waltham, Mass., has been dissolved. Mr. Blake has withdrawn to devote his time to the Edward Blake Co., 634 Commonwealth Ave., Newton Centre 59, Mass., which company will continue to have the sole sale of certain of the machines made by the Waltham Machine Works.

POTTER & JOHNSTON CO., Pawtucket, R. I., the newly formed and wholly owned subsidiary of Niles-Bement-Pond Co. (Pratt & Whitney) West Hartford, Conn., has announced the appointment of the following executives: FREDERICK U. CONARD, chairman of the board; CLAYTON R. BURT, president; E. P. GILLANE, vice-president and controller; J. EARLE MAKANT, vice-president and factory manager; J. POTTER CUNNINGHAM, vice-president and sales manager; R. W. BANFIELD, secretary and treasurer; and CARL A. G. BIRKEDAL, assistant secretary and assistant treasurer.

New York and New Jersey

CARBORUNDUM CO., Niagara Falls, N. Y., has started construction on a new building at Wheatfield, N. Y. This building, together with four buildings formerly occupied by the Bell Aircraft Corporation, will house the Coated Products Division of the company. It is expected that the new factory will be completed next September.

SWAN-FINCH OIL CORPORATION, Rockefeller Center, New York, N. Y., has appointed NELSON V. JOYCE vice-president in charge of purchasing and JOHN M. PARKER, JR., sales manager of the Tractor Division. Mr. Joyce was previously vice-president in charge of the company's western department.



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improves even your best drawing!

Order an Ozacloth print of your best pencil or ink drawing... and you'll be the first to admit the improvement.

For Ozacloth has characteristics never present in an original drawing... never offered before in an "Intermediate" print:

1. OZACLOTH increases the opacity of pencil and ink images...gives you a translucent "duplicate" which produces better prints than the original.

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6. OZACLOTH cuts costs! For example, you can make a permanent 8½ x 11 print for 26 cents; a 17 x 22 print for 52 cents. *A fraction of the cost of your original drawing... yet full insurance for years to come!*

Mail coupon today for *free* Ozacloth sample.

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OZALID, A Division of General Aniline & Film Corporation, Johnson City, New York

Gentlemen:

☐ Please send free sample of new Ozacloth.

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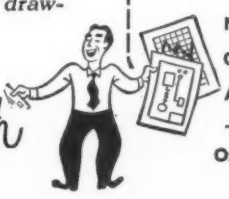
See ★ Feel ★ Try new Ozacloth



Ozalid in Canada—Hughes Owens Co., Ltd., Montreal

HINDERLITER TOOL CO. DIVISION OF THE H. K. PORTER CO., INC., Pittsburgh 22, Pa., manufacturer of equipment for drilling and oil production, has announced the appointment of J. E. SAWTELLE as manager of the export division. Mr. Sawtelle will be located at the New York offices (50 Church St.) of H. K. Porter Co.

REED ROLLED THREAD DIE CO., 237 Chandler St, Worcester 2, Mass., has appointed EDWARD F. GALVIN, of the Tool Sales Co., representative in metropolitan New York and southwestern Connecticut, with offices at 224 E. 38th St., New York 16, N. Y.

EARL B. MACDONALD has been appointed vice-president and general manager of the Machine Tool Division of the Syracuse Supply Co., Syracuse 1, N. Y. Mr. MacDonald was formerly sales manager of the division.

FRANK B. NEWBERT has been appointed assistant general purchasing agent for the American Brake Shoe Co., 230 Park Ave., New York 17.

AMERICAN CAR & FOUNDRY CO., 30 Church St., New York 8, N. Y., has appointed WILLIAM H. SCHUSTER welding supervisor.

R. F. TEELING of Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J., has been appointed manager of the local sales branch formerly known as "New Jersey Sales," which will now function as the "North Jersey Branch."

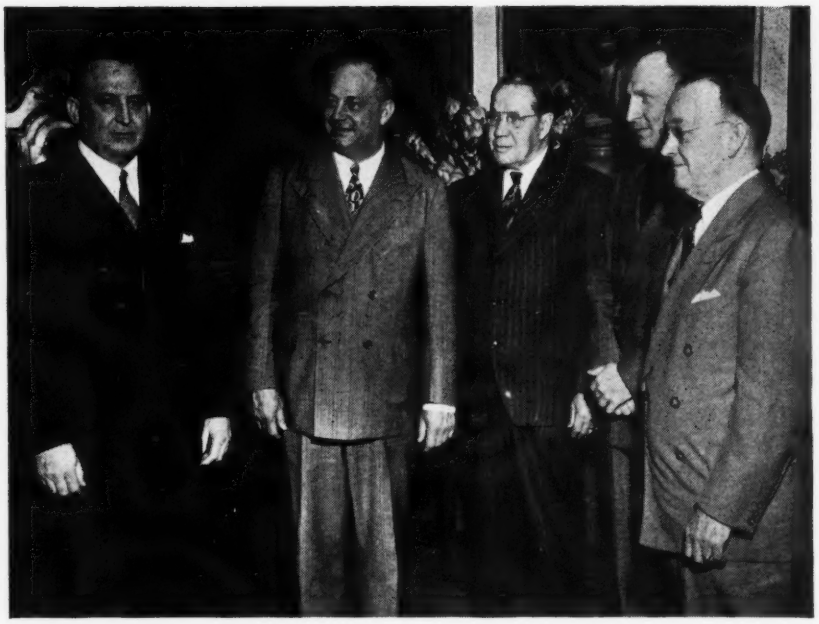
Ohio

JOHN E. BARBIER has been appointed sales manager of the Murchey Machine & Tool Co., and has also been placed in charge of tap sales for the Sheffield Corporation, Dayton 1, Ohio. FRANK A. HENRY, JR., has been named field sales manager for Murchey products, and FRED L. GRAHAM field sales manager for Sheffield taps. The Sheffield Corporation acquired the Murchey Machine & Tool Co., of Detroit, last spring, and is operating the business as an independent subsidiary, executive offices of both companies being in Dayton, Ohio.

John E. Barbier, Newly Appointed Sales Manager of Murchey Machine & Tool Co.

FRED B. ROTH, formerly supervisor of the Monarch Machine Tool Co.'s Service Department in Sidney, Ohio, has been transferred to the West Coast as sales and service adviser to a number of dealers who represent Monarch products there. He will make San Francisco his headquarters. DONALD J. HARSHBARGER has been transferred to the New York office. CLARENCE J. CALDWELL and J. A. GARRISON will become field sales engineers for the company, with headquarters in Chicago. JOHN P. WISENER goes to the company's Cleveland sales office.

GEORGE P. GRADOLF, for many years vice-president and treasurer of the Cincinnati Bickford Tool Co., Cincinnati, Ohio, manufacturer of drilling machines, has been elected chairman of the board. He will continue to fill the position of treasurer. OZNI E. SCHAUER has been made president and general manager of the company, succeeding the late August H. Tuechter. Mr. Schauer has been employed by the company for thirty-three years, having served as secretary and works manager since 1935. NEIL C. SCHAUER has been elected vice-president and sales manager; L. LEE SCHAUER, vice-president and chief engineer; PAUL E. HECKEL, secretary; and C. SHARLTON SLETE, assistant treasurer.



Newly Elected Officers of the Cincinnati Bickford Tool Co. (Left to Right) L. Lee Schauer, Vice-president and Chief Engineer; Ozni E. Schauer, President and General Manager; George P. Gradolf, Chairman of the Board and Treasurer; Paul E. Heckel, Secretary; and Neil C. Schauer, Vice-president and Sales Manager

OSCAR A. AHLERS has been elected a vice-president of the Sheffield Corporation, Dayton, Ohio. Mr. Ahlers has been a member of the Sheffield organization for twenty-three years.

Oscar A. Ahlers, Newly Elected Vice-president of the Sheffield Corporation

MACHINERY'S DATA SHEETS 609 and 610

RECOMMENDED THICKNESS OF CARBIDE TIPS FOR SINGLE-POINT TOOLS—1

The alignment chart in Data Sheet No. 610 can be used to quickly determine a safe tip thickness for designing single-point carbide-tipped tools. It is based on a series of calculations, the results of which have been adjusted according to actual experience.

Loading on the tip of a tool depends primarily on the depth of cut and the feed. Numerous tests have shown that the cutting speed has relatively little effect in determining the loading on the tip, and this factor, therefore, need not be taken into consideration.

The feed and depth of cut to be used for a specific operation must be selected before using the chart. The feed (in inches per revolution) is then located on the vertical scale at the left-hand side, and the depth of cut (in inches) on the vertical scale at the right-hand side. By laying a straightedge between these two points, the tip thickness can be read directly on the diagonal line in the center.

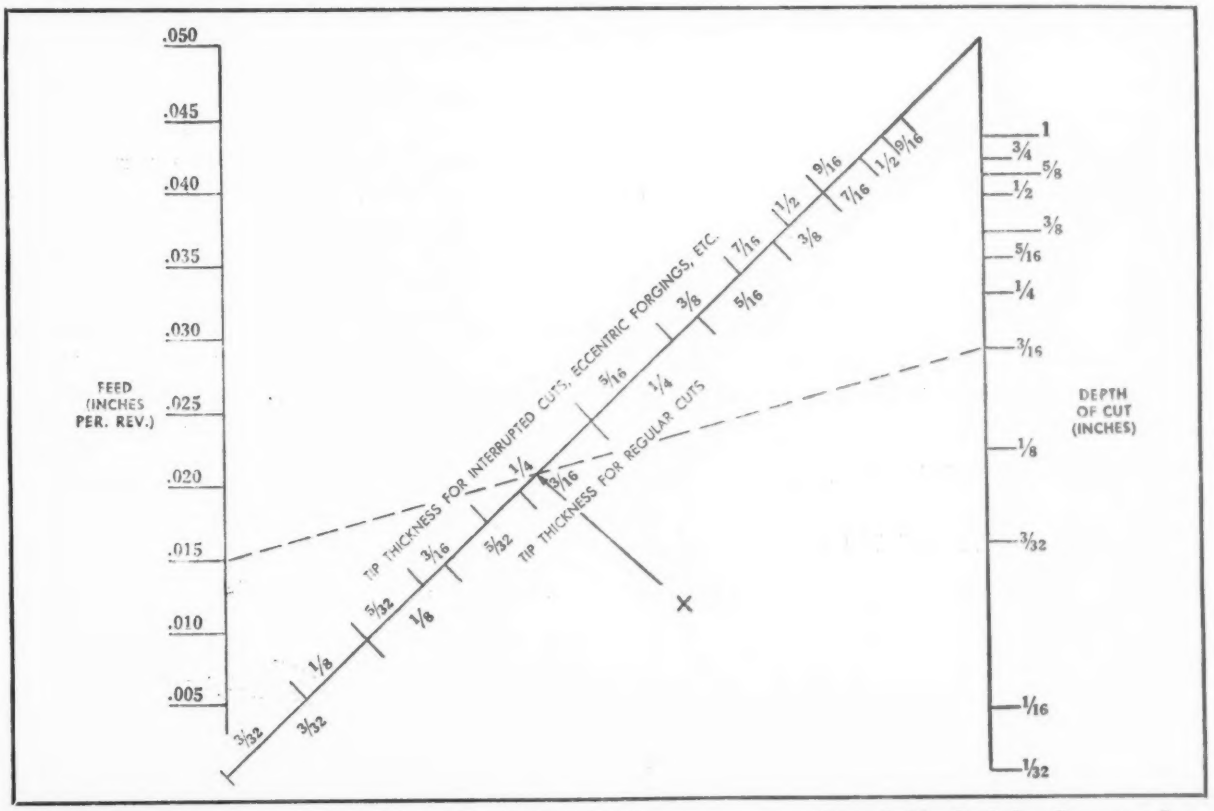
For example, if a feed of 0.015 inch per revolution and a depth of cut of 3/16 inch are to be used, the straightedge is laid between these two points on the vertical scales, as indicated by the broken line. This line intersects the diagonal "tip thickness" line at *X*. It will be seen that for an interrupted cut, the tip thickness should be 1/4 inch, while for regular or continuous cuts, a tip thickness of 3/16 inch should be used.

This chart can be used for designing a large percentage of the single-point carbide-tipped tools used for machining steel or iron alloys. There are, of course, certain jobs where modifications are required. For instance, when the material being cut sets up less shearing stress than steel or iron alloys, thinner tips can be used. On the other hand, to cut extremely tough materials, thicker tips may be necessary.

MACHINERY'S Data Sheet No. 609, May, 1948

Compiled by Carboloy Company, Inc., Detroit, Mich.

RECOMMENDED THICKNESS OF CARBIDE TIPS FOR SINGLE-POINT TOOLS—2



MACHINERY'S Data Sheet No. 610, May, 1948

Compiled by Carboloy Company, Inc., Detroit, Mich.

IS SURFACE TREATMENT NECESSARY?

Usually no surface treatment is necessary on broaches. However, on some operations a surface treatment can increase the over-all performance of broaches . . . *but* this increased performance must be measured in terms of surface treatment *cost.*

No one treatment can be a *"cure-all"* . . . the one that produces the finest finish and longest wear life is dependent upon the particular job. The form, amount of stock removed and the material all must be considered.

Detroit Broach will assist you in deciding whether surface treatment is advisable and, if so, will assist in the selection of the proper type. This *individual* selection pays you greatest dividends.

Detroit Broach is prepared to apply several types of surface treatment . . .

HARD SURFACING

•

OXIDIZING

•

LIQUID HONING

•

ELECTROLYTIC PLATING

DETROIT *Broach* COMPANY

20201 SHERWOOD AVENUE

DETROIT 12, MICHIGAN

ROBERT W. KERR has been elected a vice-president and director of the Bingham-Herbrand Corporation, Toledo, Ohio, manufacturer of brake-lever assemblies and drop-forged products. He will be associated with the Herbrand Division of the organization at Fremont, Ohio, where forged hand tools are manufactured. Mr. Kerr formerly held the position of executive vice-president and sales manager of the Plomb Tool Co., Los Angeles, Calif.

Pennsylvania

CHARLES S. REDDING recently observed his fortieth anniversary with the Leeds & Northrup Co., Philadelphia, Pa., manufacturer of electrical measuring instruments, automatic controls, and heat-treating furnaces. He has been president of the company since 1939, when he succeeded the founder, Morris E. Leeds, who was elected chairman of the board. Mr. Redding first entered the employ of the company as a draftsman.

DR. JOHN A. HUTCHESON has been appointed director of the Research Laboratories of the Westinghouse Electric Corporation, Pittsburgh, Pa., succeeding DR. L. WARRINGTON CHUBB. Dr. Chubb, who is retiring from active direction of the laboratories for reasons of health, has been named director-emeritus and will continue to serve in an advisory capacity. Dr. Hutcheson was formerly associate director of the laboratories.

FRANK R. PALMER, formerly vice-president in charge of sales of the Carpenter Steel Co., Reading, Pa., has been elected president to succeed J. HEBER PARKER, who has been named chairman of the board. RANSFORD V. MANN, previously general sales manager, will succeed Mr. Palmer as vice-president in charge of sales. Mr. Parker has been with the company for forty-five years, Mr. Palmer for thirty-one years, and Mr. Mann for thirty-seven years.

G. E. STOLTZ has been appointed consulting metal-working engineer of the industry engineering department, and W. R. HARRIS manager of the metal-working section, industry engineering department for the Westinghouse Electric Corporation, East Pittsburgh, Pa. Mr. Stoltz was previously manager of the metal-working section. Mr. Harris has been in the engineering department for the last ten years.

WESTINGHOUSE ELECTRIC CORPORATION has purchased additional manufacturing facilities in western Pennsylvania near Irwin, Pa. The buildings will be occupied by the mica processing section of the Westinghouse Transportation & Generator Division, which was previously located at East Pittsburgh.

F. J. STOKES, founder and president since 1895 of the F. J. Stokes Machine Co., Philadelphia, Pa., manufacturer of powdered-metal fabricating equipment and tabletting machines, has become chairman of the board. He is succeeded in the presidency by FRANCIS DOUGHERTY, JR. Mr. Dougherty was previously secretary-treasurer of the company.

WILLIAM H. BUCH has been appointed assistant personnel director of S K F Industries, Inc., Philadelphia, Pa., manufacturer of ball and roller bearings.

Frank R. Palmer, Recently Elected President of the Carpenter Steel Co.

Ransford V. Mann, Vice-president in Charge of Sales, Carpenter Steel Co.

J. Heber Parker, New Chairman of the Board of the Carpenter Steel Co.

LANDIS TOOL CO., Waynesboro, Pa. announces the appointment of the following distributors for its line of cylindrical grinding machines: B. L. SYLAR & SON, 105 Belvoir Ave., Chattanooga, Tenn., and MOORE HANDLEY HARDWARE CO., INC., 27 S. 20th St., Birmingham 2, Ala.

WILLIAM B. TODD has been elected executive vice-president and a director of Continental Foundry & Machine Co., Pittsburgh, Pa. Mr. Todd is resigning as assistant to the president of the Aetna Standard Engineering Co., to assume his new duties.

A. O. ANDERSON has been appointed senior field engineer of the Western Division for Rack Engineering Co., Pittsburgh, Pa. Mr. Anderson was formerly product control manager of Ditto, Inc., Chicago, Ill.

* * *

Standardization Seminar

Dr. John Gaillard, mechanical engineer on the staff of the American Standards Association and lecturer at Columbia University, has scheduled a five-day seminar on industrial standardization, June 21 to 25, in Room 503, Engineering Societies Bldg., 29 W. 39th St., New York City. Each of two daily conferences will consist of a lecture by Dr. Gaillard, followed by a round-table discussion. An outline of the ten lectures and details about registration can be obtained from Dr. Gaillard by addressing him either at his home, 400 W. 118th St., New York 27, N. Y., or at the American Standards Association headquarters, 70 E. 45th St., New York 17, N. Y.

Obituaries

R. H. McCarroll

Russell H. McCarroll, director of chemical engineering and chemical and metallurgical research for the Ford Motor Co., Detroit, Mich., died suddenly on March 31 at the age of fifty-eight years. Mr. McCarroll, a native of Detroit, had been employed by the company since 1915. He is credited with developing some fifty processes, most of them in metallurgical techniques, which aided in the mass production of the Ford car.

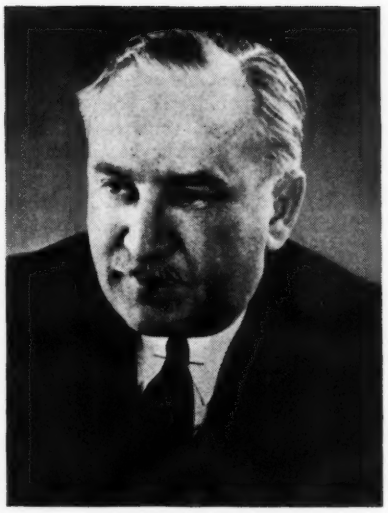
In 1914, he received his bachelor of science degree from the University of Michigan, and was made honorary master of science in 1937. He became head of the Chemicals and Metals Department of the Ford Motor Co. in 1921, and in 1944 was appointed executive engineer in charge of all chemical and metallurgical work. In addition to his work at Ford, he held many other responsible posts. Survivors include his wife and two daughters.

Russell H. McCarroll

W. B. du Mont

W. B. du Mont, president and director of the du Mont Corporation, Greenfield, Mass., died on March 22. Mr. du Mont founded the company bearing his name to manufacture the line of "Minute Man" keyway broach kits and other tools. Born in Sheffield, Alabama, Mr. du Mont came to Greenfield at an early age and was long identified with the growth of the tap and die industry.

After completing the apprentice training course of the Greenfield Tap & Die Corporation he became a member of the sales department, and later was transferred to the export department. Following a term of service in the U. S. Navy during World War I, he rejoined the Greenfield Tap & Die Corporation as export sales manager. In 1925, Mr. du Mont was made general sales manager of the corporation and later became vice-president in charge of sales and a director. In 1939 he resigned and became vice-president and a director of the Threadwell Tap & Die Co. of Greenfield, later being made chairman of the board. In 1946, he resigned this position to found the du Mont Corporation.



W. B. du Mont

David Findlay

David Findlay, former president of the L. S. Starrett Co, Athol, Mass., died on April 3. Mr. Findlay had been actively associated with the company for fifty-five years. He started selling Starrett tools in 1891, assisting LeRoy S. Starrett, founder of the concern. At the turn of the century he was appointed general sales manager, and through his energy, loyalty, and outstanding ability, became a director, vice-president and eventually president of the company. Mr. Findlay retired early in 1946, and was succeeded by the present president, Arthur H. Starrett.

G. A. Fritschi, manager of the Pittsburgh Sales District for the Vanadium Corporation of America, died on April 13 at the age of fifty-two, following a heart attack. He had been associated with the company since its incorporation in 1919, and with its predecessor, the American Vanadium Co., since 1910.

Alexander L. Bletz, plant engineer for a number of years for S K F Industries, Inc., of Philadelphia, died on April 1, following a long illness. He was fifty-three years old. For the last two years he had acted in an advisory capacity on plant engineering problems for the company.

Mr. Bletz, a native of Germany, joined S K F in 1928 after having spent five years in Spain and North Africa as consulting engineer on electrical installations and two years with the Philadelphia Electric Co.

John Earl Woodland, vice-president of Detecto Scales Inc., Brooklyn, N. Y., died on March 16.

Coming Events

May 27-29—Annual meeting of the Society for Experimental Stress Analysis at the Roosevelt Hotel in Pittsburgh, Pa. Secretary-treasurer, W. M. Murray, P. O. Box 168, Cambridge 39, Mass.

May 31-June 3—Spring meeting of the National Electrical Manufacturers Association, Motor and Generator Section, in Hot Springs, Va. Headquarters of Association, 155 E. 44th St., New York 17, N. Y.

June 21-25—Annual meeting and exhibit of the American Society for Testing Materials in Detroit, Mich. Society headquarters, 1916 Race St., Philadelphia 3, Pa.

June 28-July 1—Annual convention and Industrial Finishing Exposition of the American Electroplaters Society in the Convention Hall, Atlantic City, N. J. National office of the Society, Jenkintown, Pa.

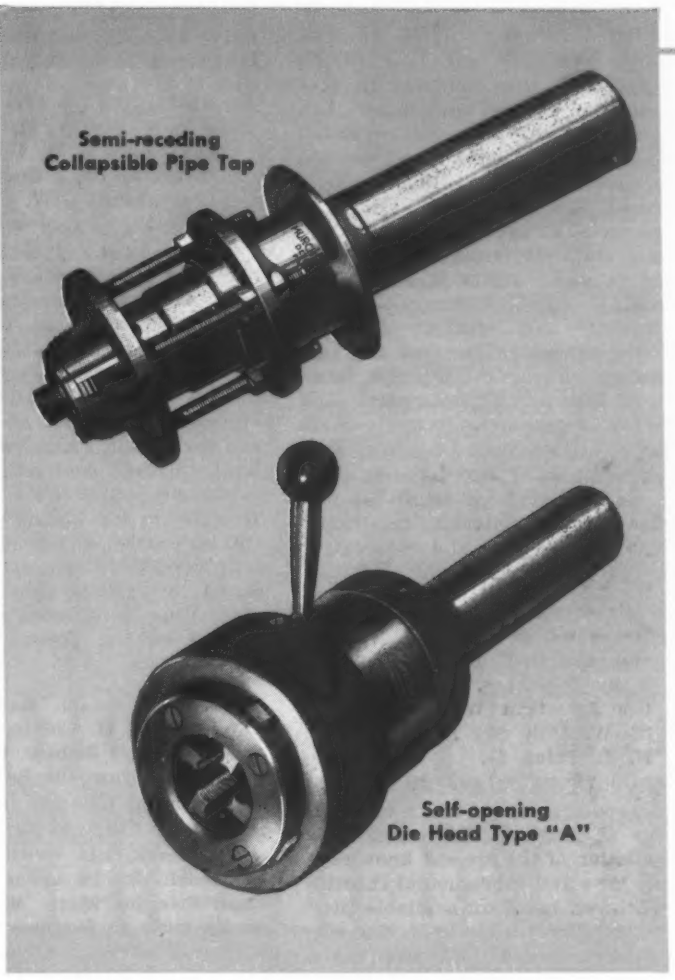
August 10-13—First Western Packaging Exposition and Conference on Packaging, Packing, and Shipping at the Civic Auditorium, San Francisco, Calif. Sponsored and managed by Clapp & Poliak, Inc. Empire State Bldg., New York 1, N. Y.

September 13-17 — Third Instrument Conference and Exhibit under the sponsorship of the Instrument Society of America, Pittsburgh 12, Pa., in Convention Hall, Philadelphia, Pa.

September 27 - October 1 — Third National Plastics Exposition in Grand Central Palace, New York. Sponsored by the Society of the Plastics Industry, Inc. Chairman, Nelson E. Gage, 295 Madison Ave., New York City.

October 11-13 — Sixteenth annual convention of the National Lubricating Grease Institute at the Edgewater Beach Hotel, Chicago, Ill. Executive Secretary, Carl E. Bolte, 4638 Mill Creek Parkway, Kansas City 2, Mo.

A BETTER, MORE ECONOMICAL METHOD OF THREADING PIPE



The Murchey Pipe Tap

illustrated is a semi-receding, collapsible unit for cutting taper threads from 1¼" to 7" in diameter in cast iron or other materials of similar hardness. Larger sizes are available. For harder materials, the Murchey full receding tap is preferable. Either is used on standard automatic screw machines, drill presses, turret lathes, hand screw machines and special threading machines. These tools can also be arranged to cut straight threads. Both are available in the lever-operated or rotating type.

The Murchey Pipe Die

Types A and C are used for cutting taper pipe threads from ⅛" to 6". Larger sizes are also available. Type A is a stationary pull-off unit for use on machines where the tool is stationary.

Type C is a yoke-operated tool for use on machines which rotate the tool. Excellent production records have been achieved by these tools on a wide range of pipe threading work.

2935

Hope to see you at the ASTE Show, Booth 830

Consult a Murchey Engineer

MURCHEY MACHINE & TOOL CO.
Detroit 26, Mich.

Lowest cost per thread . . .
WITH MURCHEY TOOLS

MURCHEY

Manufacturers of collapsible taps, self-opening die heads (tangent and radial chaser types) and special threading tools

SUBSIDIARY OF THE SHEFFIELD CORP.
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New Books and Publications

FORMING OF AUSTENITIC CHROMIUM-NICKEL STAINLESS STEELS. By V. N. Krivobok and G. Sachs. 309 pages, 8 1/2 by 11 1/4 inches. Published by the International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. Price, $4.

This book was compiled to give fabricators of metal equipment a better understanding of the adaptability of stainless steels to all modern processes of forming. It presents a detailed description of the forming procedures as applied to chromium-nickel stainless steels and as practiced in many plants in the United States.

Bending and straight flanging, forming of curved sections and tubing, deep-drawing, die forming, forming of contoured-flanged parts, and forming by miscellaneous methods are some of the subjects discussed. Specific examples of forming technique are supplemented by details of tool design and tool materials, lubricants, data on dimensions, and consecutive steps in fabrication.

THE FRACTURE OF METALS. By M. Gensamer, E. Saibel, J. T. Ransom, and R. E. Lowrie. 84 pages, 6 by 9 inches. Published by the American Welding Society, 33 W. 39th St., New York 18, N. Y. Price, $1.

This book was originally compiled as a report to the Bureau of Ships of the U. S. Navy. It represents a compilation of the present knowledge of the laws and fundamental theories of fractures, based on available literature and direct interviews. The contents are divided into two parts. Part I includes a survey of available literature, an analysis of the theories of fracture, and applications of these principles. Part II explains new developments in the theories of fracture and plastic flow. An extensive bibliography of approximately 300 references is included, and a recommended research program is outlined.

CORROSION HANDBOOK. By Herbert H. Uhlig. 1221 pages, 6 1/4 by 9 1/4 inches. Published by John Wiley & Son, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $12.

This comprehensive handbook incorporates the work of over one hundred authorities, and has been prepared under the auspices of the Electrochemical Society and the Society's Corrosion Division. Its purpose is to provide a condensed summary of information covering all phases of corrosion, including a cross-section of scientific data and industrial experience.

The major part of the book deals with corrosion prevention and the behavior of metals and alloys in various environments at both ordinary and extreme temperatures. Emphasis is on quantitative rather than qualitative data. Current corrosion theory is covered, as is corrosion testing.

ALUMINUM AND ITS APPLICATIONS. By Hiram Brown and Associates. 338 pages, 6 by 9 inches. Published by the Pitman Publishing Corporation, 2 W. 45th St., New York 19, N. Y. Price, $5.75.

The practical applications of aluminum and its alloys are described in this book in individual chapters written by authorities in the fields of aircraft assemblies, aircraft engines, aircraft castings, automotive manufacture, railroads, marine assemblies, electrical appliances and equipment, and the chemical industries. The first light chapters deal with the fundamental properties of the major alloys, after which fabricating methods, finishing, testing, and heat-treating are fully discussed, with each step illustrated by photographs and drawings. The book concludes with a chapter on the present and future of aluminum.

STARTING A SMALL MACHINE SHOP. By Fred H. Colvin. 212 pages, 5 by 7 1/2 inches. Published by the McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y. Price, $2.50.

This book was written to assist the machinist in opening his own small machine shop. Mistakes commonly made in business are pointed out, and ways of preventing them are explained. It describes the choice of a suitable location, the selection of machines and other equipment, the storing of materials, the amount to charge for different kinds of work, etc. Managing principles and methods of supervising employes are discussed, and methods of adapting a small shop to handle specialized jobs are described.

HOT-DIP GALVANIZING PRACTICE. Second Edition. By W. H. Spowers, Jr. 188 pages, 6 1/4 by 9 1/4 inches. Published by the Penton Publishing Co., 1213 W. 3rd St., Cleveland 13, Ohio. Price, $6.

The latest improved galvanizing methods are discussed in the second edition of this book, just published. It describes in detail various steps involved in galvanizing wire, netting, cloth, pipe, pipe fittings, sheets, stamped metalware, boilers, and barrels. The procedure to be followed in building a galvanizing plant is outlined. Electrically heated kettle settings; pyrometry; how to reduce dross losses; and types and chemical reaction of fluxes are other subjects dealt with.

HOW TO TAKE INDUSTRIAL PHOTOGRAPHS. By M. H. Zielke and F. G. Beezley. 113 pages, 10 1/2 by 8 1/4 inches. Published by Whittlesey House, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price, $5.

As the use of photographs to help sell products is becoming an increasingly important trend in industry, this book giving specific instructions on taking industrial photographs should be of considerable interest. It presents more than one-hundred striking industrial photographs and gives complete information on the equipment used and method of taking each photograph. The aim is to help the photographer of industrial subjects avoid pitfalls.

BEST'S SAFETY DIRECTORY (1948). 494 pages, 8 3/8 by 11 1/4 inches. Published by the Safety Engineering Magazine, a division of Alfred M. Best Co., Inc., Best Bldg., 75 Fulton St., New York 7, N. Y. Price, $5.

This directory, of which this is the second annual edition, covers the fields of safety, fire protection and control, hygiene, first aid, and sanitation. It combines the features of a safety manual, directory, index, encyclopedia, and catalogue in one volume. The book recommends safety products or devices to be used for specific hazards and tells how to use them and where to get them.

PRECISION INVESTMENT CASTINGS. By E. L. Cady. 356 pages, 6 1/4 by 9 1/4 inches. Published by the Reinhold Publishing Corporation, 330 W. 42nd St., New York 18, N. Y. Price, $6.

The history and development of precision investment casting are described in this book. It covers product design; materials that can be cast; design and manufacture of patterns and molds; and details of the casting process. One chapter compares precision investment casting with other processes.

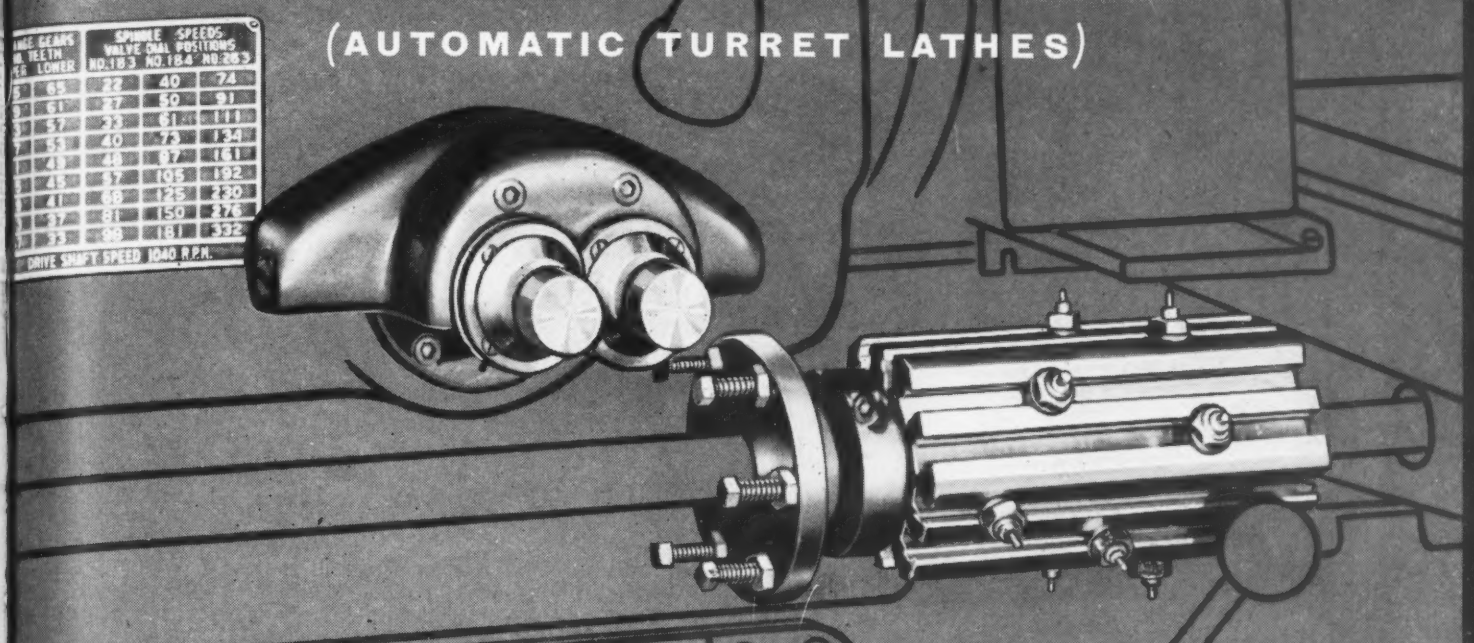
* * *

Ejector-Tool Slide Film

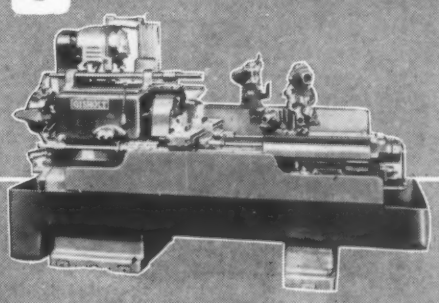
A slide film entitled "Advantages and Economies of Ejector Type Tools with Carbide Inserts" has been completed by the Super Tool Co., 21650 Hoover Road, Detroit, Mich. This film deals with features of both the horizontal type ejector tool in straight and offset designs and the vertical type with square, round, triangular, and rectangular carbide inserts. Photographs of operations demonstrate how these tools offer economies.

GISHOLT FASTERMATICS

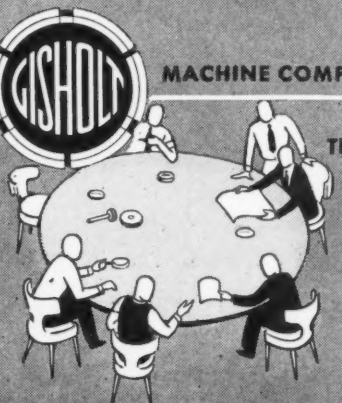
(AUTOMATIC TURRET LATHES)



These simple controls provide automatic (or manual) selection of speeds--to save time --cut machining costs



GISHOLT MACHINE COMPANY, *Madison 3, Wisconsin*



THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.

THE FASTERMATICS—Speed changes are effected as buttons in spool contact hydraulic control knobs. Changes may be made automatically at any point during hexagon turret's travel, or manually for convenience of set-up. Various ranges of spindle speeds are available.

turret lathes · automatic lathes · superfinishers · balancers · special machines

Westinghouse Manufacturing Set-Up for Alternating-Current Welders

Alternating-current arc-welders of the Flexarc line, brought out last year by the Westinghouse Electric Corporation and described in December, 1947, MACHINERY, are now being built on a production basis in the Buffalo plant of the concern. Assembly operations are performed along roller conveyors, the frame base of the welders being mounted on wooden pallets which are moved along the conveyor. These pallets are later incorporated in the wooden cases in which the arc-welders are shipped.

Fig. 1 shows a spot-welding operation in the arc-welder manufacturing line performed by a machine provided with a Westinghouse electronic control. The operation is employed to attach panels to an arc-welder case. Fig. 2 shows the checking of an arc-welding set along the conveyor line. These alternating-current arc-welding sets are produced in various ratings to meet a wide range of applications.

* * *

Massachusetts Institute of Technology Receives Grant from Texas Co. for Atomic Research

A $250,000 grant for atomic research and training of nuclear scientists has been made to the Massachusetts Institute of Technology by the Texas Co., according to a recent announcement by Dr. Karl T. Compton, president of the Institute, and Colonel Harry T. Klein, president of the Texas Co. The funds will be used for long-range pure research in nuclear fission and related basic studies on the ultimate nature of matter and energy, for constructing high-voltage equipment of advanced design, and for training scientists in nuclear theory and its application.

* * *

The Aluminum Co. of America is using more than six and a quarter million pounds of aluminum in the construction of a sheet and plate rolling mill at Davenport, Iowa. The plant, which extends for almost a mile along the banks of the Mississippi River, is an all-aluminum project, with the exception of 25,000 tons of structural steel framework.

Fig. 1. (Above) Spot-welding Operation in the New Manufacturing Line Established for the Production of Westinghouse Alternating-current Arc-welders

Fig. 2. (Right) Checking the Electrical Characteristics of an Alternating-current Arc-welding Set at a Point along the Assembly Line